Technical University of Denmark

Annual Report **2010**

DTU Chemical Engineering
Department of Chemical and Biochemical Engineering

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ANNUAL REVIEW

Head of Department

CHEMICAL ENGINEERING: FROM THE ROOTS OF SCIENCE TO THE LATEST BRANCHES OF INDUSTRIAL INNOVATION

Kim Dam-Johansen
Professor, Head of Department

2010 was a successful year. We continued our expansion into virgin research territory while further strengthening and broadening our cooperation with partners in industry and academia.

There is a high and continuously growing demand for sustainable fuels for power and transport and for better and greener products and processes in the chemical, pharmaceutical, and biotechnical industries. This puts a strong emphasis on the innovation and improvement of existing products and processes, while requiring highly spezialized chemical engineers. However, succesful innovation and long-lasting career perspectives call for more than specialization, and we are acutely aware of the importance of education and innovation that is firmly rooted in the core chemical engineering disciplines.

In 2010, we introduced a new logo, presented at the back cover of this publication. The logo features a stylized illustration of a flow chart for conversion and separation processes typical of chemical and biochemical engineering. The logo also symbolizes the department's emphasis on balancing quantative theoretical methods with practice through experimental work, both in education and research.

Strong interaction with the surrounding world has for many years been a key focus point for us. The department was proud to host the third Danish Conference for Chemical Engineers, Dansk KemiingeniørKonference (DK2), from May 31st to June 2nd, 2010. Two hundred and sixty participants, and more than 60 contributing companies, helped to make the event a remarkable success and meet the goal of building stronger networks between chemical engineers across different and highly specialized areas.

Major New Projects and Collaborations
Also in terms of new research projects 2010 was a successful year. To highlight just a few major projects from a large list: Professor Peter Glarborg was assigned as head of a new research platform, "Power Generation from Renewable Energy" (GREEN), a research collaboration focusing on efficient use of biomass as fuel in power plants. The theme is supported by the Danish Agency for Science, Technology and Innovation with a 35 million DKK grant. In the biotech field Professors John Woodley and Krist Gernaey launched a project that investigates how micro factories can enhance conversion of fuel from biomass via enzymatic catalysis, a novel idea with possible wide perspectives. In the food area Professor Jørn Dalgaard Mikkelsen has embarked on a broad collaboration focusing on enzymatic production of prebiotic super-sugars. He is head of the Human Milk Oligosaccharide (HMO) project, a collaboration with Arla Foods and many other partners, with a total budget of 36 million DKK out of which the Danish Council for Strategic Research has granted DKK 20 million.

A "Full House" For the Summer
In 2010, Professor Gunnar Jonsson celebrated his 40-year jubilee as a DTU employee, and on May 27th. Jonsson gave the seminar, "40 Years in Membrane Technology," to a fully packed auditorium. I would like to thank Professor Jonsson for his diligent work over the years and for his important contributions to the field of Membrane Technology.

During the summer of 2010, the Danish Polymer Center (DPC) moved from building 423 and "home" to fully renovated laboratories in bulding 227. This was the fulfillment of a long-held wish to again have DPC closer to the other parts of the department.

In July and early August, the department was bustling with activity as our success with the summer school for European and American students continued; during five weeks, 62 students worked in our pilot labs with process technology and unit operations.

Prizes and Awards
2010 offered plenty of recognition in the form of prizes and awards given to our employees and students. In April, Professor Søren Hvilsted received the 2010 Elastyren Prize motivated by his outstanding contribution to chemical polymer research with application in the medical field. Professor and Head of the CAPEC research center, Rafiqul Gani, received the CAPE Award for a Recent Innovative Contribution, and PhD student Ravendra Singh received the EFCE Excellence Award 2010 in recognition of an outstanding PhD Thesis. In October, PhD student Charlotte Juel Fristrup received the 1st Scientific Prize for Oral Presentation at the Novo Nordisk STAR Symposium 2010. And ending the year, PhD student Martin Nørby received a scholarship worth 75.000 DKK from Carlsbergs Mindelegat in December. Congratulations to all.

Exchange of ideas and knowledge locally as well as in a broad and cross-disciplinary context is the alpha and omega of succesful research and innovation. I would like to thank all our cooperation partners in industry and academia, and I invite any interested parties to contact us with respect to future collaborations.

I hope you will enjoy reading our 2010 Annual Report.

Kim Dam-Johansen
Professor, Head of Department


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HIGHLIGHTS 2010



From May 31 to June 2, 2010, DTU Chemical and Biochemical Engineering hosted the third Danish conference for chemical engineers, Dansk KemiingeniørKonference (DK2). With a total of 130 presentations and 260 participants representing more than 60 organisations and companies, the conference successfully reached its goal of creating a stronger focus on diversity, networking, innovation and recruitment of students. **1**) Kim Pandrup Christensen, Director of Technology Andritz Feed and Biofuel A/S and member of the DTU Chemical and Biochemical Engineering Advisory Board.

HIGHLIGHTS 2010

JANUARY

JANUARY 1

PROCESS – a new center at DTU Chemical Engineering

The new center Process Engineering and Technology is formed at DTU Chemical Engineering. With the short name, PROCESS, the center is to be led by John Woodley with assistance from Krist V. Gernaey and several associated members.

JANUARY 14

Professor Rafiqul Gani appointed as Professor of Process Plant Design at University of Twente

Professor Rafiqul Gani accepts a part-time position of Professor in Process Plant Design at the faculty of Science and Technology, the University of Twente, the Netherlands, to support the Dutch university during 2010 in the field of system design.

CAPEC paper wins the best paper award at 2nd Annual Gas Processing Symposium 2010 in Qatar

The paper "Design of sustainable processes: Systematic generation and evaluation of alternatives", coauthored by Ana Carval-ho, Rafiqul Gani and Henrique Matos and presented by Ana Carvalho wins the best paper award at the 2nd Annual Gas Processing Symposium 2010, Doha, Qatar.

JANUARY 18

Professor Jørn Dalgaard Mikkelsen heads infant formula research project

The Danish Council for Strategic Research grants DKK 20 million to a project aimed at developing ways to produce oligosaccharides, an ingredient naturally present in human breast milk. Jørn Dalgaard Mikkelsen, Professor at DTU Chemical Engineering, heads the research and coordinates efforts between DTU, Danisco, Arla Foods, the University of Southern Denmark, University of Copenhagen (KU Life) and University of Reading.

JANUARY 31 - FEBRUARY 4

Krist Gernaey invited speaker at IFPAC 2010

Associate Professor Krist Gernaey is invited to make a presentation at the 24th International Forum on Process Analytical Technology (IFPAC 2010), Baltimore (Maryland, USA). The presentation is entitled , "Mechanistic modeling for systematic design and analysis of PAT systems".

FEBRUARY

FEBRUARY 12

Professor Rafiqul Gani joins the Board of Trustees of the AIChE

Professor Rafiqul Gani is invited to join the Board of Trustees of the American Institute of Chemical Engineers (AIChE) from January 2010 for a period of three years.

FEBRUARY 22

SciToBICom kick-off meeting

The partners in the ambitious cross-european project SciToBiCom, aimed at cleaner and more efficient combustion of biomass for power production, meet for a kick-off meeting at DTU. DTU Chemical Engineering heads the DKK 20 million research project which includes some of the main actors in the field of biomass combustion from Denmark, Finland, Norway and Austria.



At DK2 Jørgen Worning (**2**), currently Managing Director and Chairman of the Board of eHouse DDE Dansk Data Elektronik A/S, gave a vibrant and personal presentation about his long and varied career, taking the audience on a journey from, among many other jobs, Worning's entrepreneurship in Venezuela to Chairman positions at FLSmidth & Co. A/S and Bang & Olufsen Holding A/S. Worning called himself a "living example that chemical engineering can lead to anything". **3**) John Woodley, Professor and head of the PROCESS center at DTU Chemical and Biochemical Engineering, during a coffee break at the DK2 conference.

MARCH

MARCH 16

Delegation from Confederation of Danish Industry visits the pilot plant at DTU Chemical Engineering

A delegation from the Confederation of Danish Industry (Dansk Industri) visits DTU and gets a tour of the pilot plant at DTU Chemical Engineering, guided by Head of department, Professor Kim Dam-Johansen.

MARCH 18-19

John Woodley gives keynote lecture at CBCS

Professor John Woodley is invited to give a keynote lecture on 'Biocatalytical Process Technology' at the Conference on Biocatalysis for Chemical Synthesis (CBCS) in Graz, Austria.

APRIL

APRIL 27

Søren Hvilsted receives the Elastyren Prize 2010

Professor Søren Hvilsted, DTU Chemical Engineering, receives the 2010 Elastyren Prize on the grounds of his outstanding contribution to chemical polymer research for application in the medical field. In addition to the honor the prize consists of the sum of DKK 100.000.

MAY

MAY 16-19

Invited lecture by John Woodley in Edinburgh

Professor John Woodley holds an invited lecture at the "Scale-up of Chemical Processes" conference, Edinburgh, UK.

MAY 19

International Cement Seminar at DTU Chemical Engineering

FLSmidth's 'International Cement Seminar' takes place at DTU Chemical Engineering. Seminar participants from all over the world visit the CHEC pilot plant guided by Professor and Head of Department, Kim Dam-Johansen, and PhD students from CHEC.

MAY 27

Gunnar Jonsson 40 year jubilee

Reader Gunnar Jonsson celebrates his 40 year jubilee as a DTU employee by giving the seminar "40 years in membrane technology". The seminar is followed by a reception in the lounge of DTU Chemical Engineering.

JUNE

JUNE 1-4

CAPEC Annual Meeting 2010

The CAPEC Annual Meeting 2010 – CAM10 – takes place at the conference center Kolle Kolle in Værløse. Eighty-three researchers from industry and academia share knowledge and insights into CAPE technology, spanning from molecular to production plant scale and covering a multitude of research fields.

JUNE 6

Professor Rafiqul Gani receives EFCE award

Professor Rafiqul Gani, Professor and Head of the CAPEC research center, receives the award 'CAPE award for a recent innovative contribution'. The prize is given by the European Federation of Chemical Engineering (EFCE) and handed over during EFCE's ESCAPE 20 Symposium in Ischia, Italy.

Besides plenary and poster sessions taking place in the Oticon Hall at DTU, the DK2 conference offered 16 parallel sessions allowing scientists, students and participants from industry to delve into more specific research areas and chemical engineering challenges. In his plenary presentation Per Falholt (**4**), Executive Vice President for R&D i n Novozymes A/S, talked about Novozyme's efforts to develop a global R&D community and gave examples of focus areas in the company's current research activities. "The education of highly qualified chemical engineers is crucial for these processes to continue," Falholt said in his conclusion.

HIGHLIGHTS 2010

JUNE 9

Ravendra Singh receives the EFCE Excellence Award 2010

Dr. Ravendra Singh is selected as the winner of the EFCE Excellence Award in recognition of an Outstanding PhD Thesis by the European Federation of Chemical Engineering (EFCE).

JUNE 9-11

CERE Annual Discussion Meeting

CERE holds its annual discussion meeting at LO Skolen outside Helsingør. Eighty people, 20 of these representatives from industry, participate in the conference which offers 29 presentations from CERE researchers.

JUNE 16-17

Focus on innovation at DK2 2010

Around 260 people participate in Dansk KemiingeniørKonference (DK2), the 3rd Danish Conference for Chemical Engineers, organized by DTU Chemical Engineering. Speakers at the plenary sessions are leading figures from industry and academia who share their insights related to innovation within state-of-the art research as well as practical challenges within major corporations.

JUNE 28 - JULY 9, 2010

Guest Course by professor Vlasis G. Mavrantzas

An advanced course on "Molecular Simulation of Complex Chemical Systems with Emphasis to Practical Applications" is given by guest professor Vlasis G. Mavrantzas, Univ. of Patras, Greece, with support from the Villum Kann Rasmussen Foundation.

JUNE-JULY, 2010

Danish Polymer Center moves 'home' to Søltoft Plads

During the summer of 2010 the Danish Polymer Center moves from building 423 to bulding 227.

JUNE 29

CHEC and Hwam A/S in wood stove collaboration

A collaboration project between the CHEC research group and the stove manufacturing company Hwam A/S is established in a joint effort to develop an automatically controlled wood stove with high energy efficiency and low emissions of pollutants. The project is granted 6.6 million DKK from EUPD.

JULY

JULY-AUGUST, 2010

62 students participate in the Summer School at DTU Chemical Engineering.

Forty-two American students participate in DTU Chemical Engineering's Summer University for non-european students and 20 students participate in the European summer school.

AUGUST

AUGUST 1

PROCESS launches collaboration with Universiteit Gent

The PROCESS center initiates a collaboration with Universiteit Gent (Gent, Belgium) on continuous tabletting and pharmaceutical manufacturing.

AUGUST 18

SPE Copenhagen 2010

Ninety-five people participate in an SPE Seminar on Enhanced Oil Recovery (EOR) hosted by CERE and with representatives from Energistyrelsen, Maersk Oil, DONG, Conoco Phillips and Schlumberger giving presentations about EOR.


Susanne Grøn (**5**), Senior Director of the food company Chr. Hansen A/S, with Professor Emeritus at DTU Chemical and Biochemical Engineering Sten Bay Jørgensen. In her presentation at the DK2 conference Grøn mentioned that an estimated 500 million people are in daily contact with Chr. Hansen's products which include ingredients for cheese, yoghurt, juice and prebiotica. Grøn talked about how LEAN is undertaken at Chr. Hansen. (**6**) Professor and Head of Department at DTU Chemical and Biochemical Engineering Kim Dam-Johansen (left) and Lars Goldschmidt, director in the Confederation of Danish Industry who gave a presentation about organisational innovation.

AUGUST 19-27

PhD summer course by professor Michelsen

Professor Michael L. Michelsen gives a summer school PhD course titled "Advanced Course on Thermodynamic Models: Fundamentals & Computational Aspects" with very good attendance and more than half of the participants coming from industry.

AUGUST 29 - SEPTEMBER 9

Søren Hvilsted arranges high-profile PhD Course

Professor Søren Hvilsted arranges a PhD course entitled "Advanced Polymer Chemistry" where all speakers are leading international experts in their respective fields.

AUGUST 27-31

Coatings course by Søren Kiil

Søren Kiil arranges a coatings course on Coatings Science and Engineering for employees in the coatings industry.

SEPTEMBER

SEPTEMBER 2-3

Visit from Dortmund University

A delegation from Department of Chemical and Biochemical Engineering at Dortmund University visits DTU Chemical Engineering to discuss further collaboration between the two departments.

SEPTEMBER 19-21

Georgios Kontogeorgis gives lecture in SAFT conference in Barcelona

Professor Georgios Kontogeorgis gives the invited lecture "The Cubic Plus Association (CPA) equation of state: What have we learnt in 15 years and future challenges "for the Conference" 20 years of the SAFT Equation: Recent Advances and Challenges" in Barcelona, Spain.

SEPTEMBER 24

Professor Gürkan Sin gives seminar in Kongsberg, Norway

Assistant Professor Gürkan Sin visits CAPEC industrial consortium member Kongsberg and gives an invited seminar to the Kongsberg Oil and Gas Technology (KOGT) group located at Sandvika, Norway.

OCTOBER

OCTOBER 1

Thirty public school teachers visit DTU Chemical Engineering

Associate Professor Anne Ladegaard Skov receives 30 public school teachers in an event arranged by Dansk Plastindustri. Besides conducting a series of practical experiments, Ladegaard Skov talks about plastic in relation to environmental issues, possibilities in the plastic industry and education related to chemistry and polymers.

OCTOBER 5

CHEC Annual Meeting 2010

The 2010 CHEC Annual Meeting features a four session programme with a total of 20 presentations. Ninety-two people participate in the seminar, 52 of these are guests from academia and industry.



On the last day of the DK2 conference, Professor Klaus F. Jensen (7), Head of the Department of Chemical Engineering at Massachusetts Institute of Technology (MIT) gave the presentation, "Molecular Engineering – the foundation for chemical engineering in 21st century". Professor Jensen gave an overview of current research in the globally leading and trend-setting Chemical Engineering department at MIT.

HIGHLIGHTS 2010

OCTOBER 8

Reception for DPC "homecoming" and renovation of building 227

During the summer of 2010 the Danish Polymer Center moved from building 423 to bulding 227. On October 8, DPC and their new neighbors BioEng invite the department on a guided tour of the renovated parts of building 227.

OCTOBER 15

Kim Dam-Johansen gives invited lecture at Åbo Akademi

Professor and Head of Department Kim Dam-Johansen gives the lecture, "Chemical Engineering – Today and Tomorrow", at the 90 year alumnee day at Åbo Akademi, Helsinki, Finland.

OCTOBER 22

Re-elections of Working Party Chairs

The EFCE Working Party on Thermodynamics and Transport Properties re-elected Professor Ioannis Economou, Greece, to chair the Working Party for a second three-year term of office. The Vice-Chairmen, Professor Georgios Kontogeorgis, Denmark, and Professor Ralf Dohrn, Germany, and the Working Party Secretary, Dr. Richard Sass, Germany, were also re-confirmed in their positions.

OCTOBER 27

Rafiqul Gani gives lecture in Texas

Rafiqul Gani gives an invited lecture on Managing the Complexity in Product and Process Engineering, as part of the 2010 Fall J.D. Lindsay Lecture Series at Texas A&M University, College Station, Texas, USA.

NOVEMBER

NOVEMBER 2

Professor Arland Hotchkiss guest at BioEng

Professor Arland Hotchkiss from the Agricultural Research Service (ARS), Maryland, USA, is a guest professor at BioEng for a five-week period.

NOVEMBER 10-11

CERE organizes PetroChallenge 2010

The PetroChallenge internet game for Danish gymnasium students is organized by CERE.

NOVEMBER 12

Danish Minister of Integration visits DTU Chemical Engineering

The Danish Minister of Refugee, Immigration and Integration Affairs, Birthe Rønn Hornbech, is invited to DTU by Rektor Lars Pallesen and visits DTU Chemical Engineering where she speaks with students from different countries about their experience of coming to Denmark.

Annual Polymer Day 2010

The Graduate School of Polymer Science (DPC) holds its 6th Annual Polymer Day 2010. The conference gives insight into the current research of polymer scientists at DPC and is highlighted by a lecture by the distinguished professor Thomas Mcleish from Durham University, UK.



8) On October 25, PhD student Charlotte Juel Fristrup, DTU Chemical Engineering, received the 1st Scientific Prize for oral presentation at the Novo Nordisk STAR Symposium 2010. **9)** On May 27 Reader Gunnar Jonsson celebrated his 40 year jubilee as a DTU employee by giving the seminar "40 years in membrane technology". **10)** Professor Søren Hvilsted (right), DTU Chemical Engineering, received the 2010 Elastyren Prize on April 27 on the grounds of his outstanding contribution to chemical polymer research wtih application in the medical field. Left: Chairman of the Elastyren Prize Committee in 2010, Sten Scheibye.

NOVEMBER 14-20

Professor Susan J. Muller visits KT

Professor Susan J. Muller from the Chemical and Biomolecular Engineering Faculty, University of California, Berkeley, visits DPC. The visit is arranged in cooperation with DTU Fluid and features. Highlights include Flow's lecture on "Rheometry, Viscous heating and Stability of Newtonian and Non-Newtonian Flows".

29 NOVEMBER - 3 DECEMBER

Visit to South Korean Universities by Professor Rafiqul Gani

On invitation from Professor Jeong Won Kang, Korea University, Professor Rafiqul Gani visits Seoul to present research done at CAPEC, learn more about the research being carried out at the universities in Korea and establish collaboration between CAPEC and different universities in Korea.

DECEMBER

New research platform: Power Generation from renewable energy

The Danish Agency for Science, Technology and Innovation gives a 35 million DKK grant to the research center "Power Generation from Renewable Energy" which is to be headed by Professor Peter Glarborg and focuses on efficient use of biomass as fuel in power plants. Other partners in the project are DTU Mechanical Engineering, DTU Risø, Aarhus University, Lund University, Stanford University, University of North Texas, HNE Eberswalde, B&W Energy, DONG Energy Power, and Vattenfall.

DECEMBER 10

DTU Chemical Engineering Christmas Seminar

Head of Department, Professor Kim Dam-Johansen, reports on the status of 2010, and prospects of current research are discussed at the departmental Christmas Seminar.

DECEMBER 13

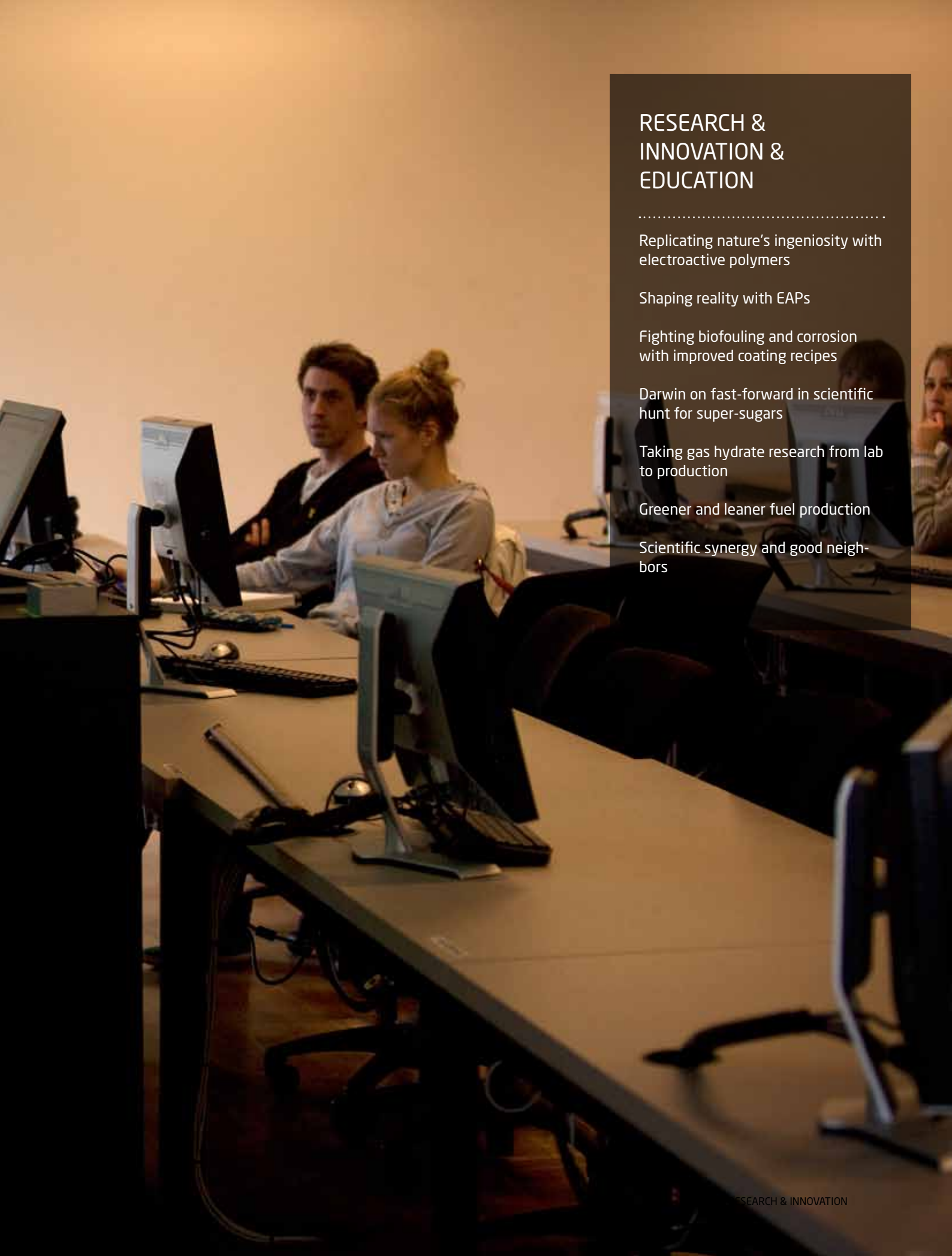
Invited lecture by John Woodley in Mexico

Professor John Woodley gives an invited lecture at the "Zing Biocatalysis Conference", Puerto Morelos, Mexico.

DECEMBER 14

CERE and RESON A/S starts oil recovery project

A consortium comprised of RESON A/S and CERE receives 10,2 million DKK in support from the Danish National Advanced Technology Foundation (Højteknologifonden) for a project dealing with the use of advanced sonar technology for the detection of oil in sea water.



RESEARCH & INNOVATION & EDUCATION

REPLICATING NATURE'S INGENIOSITY WITH ELECTROACTIVE POLYMERS

Within the field of biomimetics, the recent development of stimuli dependant silicones is fueling the advance of sometimes surprising applications. Popularly branded as "artificial muscles," these silicones belong to a larger materials group named ElectroActive Polymers (EAP). The field of their applicability addresses topics as diverse as energy harvesting, loudspeaker technology, and biomedicine, to list just a few. The latter is the focus of Postdoc Anca Gabriela Bejenariu's project entitled "Synthesis and characterization of new muscle-like thin films actuators." Anca envisions that in a not so distant future the silicone-based materials will enable people with severe burns to benefit from functional artificial skin and paralyzed or semi-paralyzed persons will regain the full control of their muscles: "People would be able to control the fingers in a prosthetic arm. You could even put a smile on a human-like robotic face," she says.

Anca's project was launched in 2010 with funding from the Danish Agency for Science, Technology and Innovation. Due to its interdisciplinary nature, the project benefits from the collaborative effort of several researchers from DTU, Risø Laboratories, and designers from Copenhagen Academy of Fine Arts. Summarizing, Anca sees the project as an attempt to "add brain to silicone muscles." Historically, the silicones have been widely used in the biomedical field as intravenous cannulae, cardiac valves, neurological shunts, or joint prostheses. However, the last decade's breakthroughs in EAP technology add a new dimension to their properties: functionality. As a result, EAPs exhibit shape changes when stimulated by an electric field. By combining their lightweight, flexibility, toughness, and shape-processability with the responsive and tunable character of their physical properties, a whole new world of applications opens up.

While these 'smart materials' hold plenty of promises, a lot of basic research is still required. Therefore, Anca is focusing on understanding and controlling the silicones "behavior" at a molecular level.

Controlling the Network

"The initial step in creating an artificial muscle is to mimic the biomechanical properties of the muscle cell's lattice. The goal is to make a 3D polymeric structure that exhibits a relatively large domain of elastic, reversible deformations," explains Anca. "Due to its complexity, the solution for which we opted is based on bimodal networks: Blends of two silicone polymers with different mechanical properties reacted with a crosslinker."

"Stemming from a difference in their molecular weights, the differences in the elasticity of the two initial silicones can be further altered by crosslinking. By blending the two, the resulting network exhibits a controllable and remarkably low elastic modulus," details Anca.

"I GUESS YOU CAN SAY I ADD BRAIN TO SILICONE MUSCLES"

Anca Gabriela Bejenariu

To date, Anca's bimodal networks casted in films of some tens of microns thick, are almost a factor of 10 softer than classical networks but with identical mechanical stability.

"The consecutive step is to replicate the neuro-muscular joint by depositing silver electrodes onto the films. It is hence the stage on which the functionality, or the transducing efficiency, of the silicones is going to be evaluated," Anca adds. For this purpose, a dedicated bench actuator from RISØ Laboratories, one of the collaboration partners, is being used.

Feedback from Designers
Outside the technical cooperation with RISØ Labs, Anca's project has attracted the interest of a group of interior and industrial designers from Copenhagen Academy of Fine Arts. "I'm valuing the opportunity to actively participate into shaping tomorrow's reality and to help morph designers visions into tangible objects," Anca says.

The unusual collaboration between DTU Chemical Engineering and Copenhagen Academy of Fine Arts came about in 2010 at Anne Ladegaard Skov's initiative and has so far spawned a series of meetings and workshops between designers and scientists.

"The meetings with the designers are highly inspirational, triggering ideas for innovative applications for my films," says Anca. An example of such applications is the "Reef" concept. Reef is the brainchild of Aurélie Mossé, PhD student from the Academy of Fine Arts, who explains, "Functionally, it is a self-actuated ceiling based on EAPs and aimed at redefining the synergy between the habitable places and the environment."

Balancing Engineering and Medicine
While Anca's polymeric networks are adopted by designers for innovative use in interior or industrial design, her main research focus remains firmly rooted in the zone where engineering meets medicine, as it has been throughout her academic career. Being a biomedical engineer, Anca finalized her PhD in France with a dissertation related to controlled drug delivery systems. Afterwards, she became a Post-Doc at DTU working on developing new characterization methods for elastomers. Since the beginning of 2010, she was granted an individual research project by the Danish Agency for Science, Technology and Innovation.

"It's a broad field to navigate in and you have to be very careful not to lose yourself by defocusing," says Anca.

"For young researchers, the biomedical engineering field offers a unique combination of opportunities. Whether I worked on developing targeted drug delivery systems or on artificial muscles, I was always intrigued by the in-depth, interdisciplinary problems and felt intellectually challenged."

(From left) Aurelia Mosse, Anca Gabriela Bejenariu and Associate Professor Anne Ladegaard Skov at "Exhibition: 1:1 – research by design" where some of the exposed objects are based on EAPs developed at DTU Chemical Engineering.

SHAPING REALITY
WITH ELECTROACTIVE POLYMERS

Associate Professor Anne Ladegaard Skov leads a pioneering group in the ElectroActive Polymer (EAP) field within the Danish Polymer Center (DPC) at DTU Chemical Engineering. EAPs can be applied as devices for harvesting energy from waves, muscle-like actuators, or new materials for loudspeakers and have a range of innovative uses in the medical field. But EAPs are also of interest to designers who can use them for innovative and groundbreaking interior or industrial design. In 2010, students from DTU Chemical Engineering and the Royal Academy of Fine Arts met in workshops and meetings where they exchanged ideas and know-how, a cooperation initiated by interior design student Aurelia Mosse who experiments with EAPs in interior and industrial design.

"EAP research is a relatively new field, and there is an open exchange of ideas and results between groups internationally," says Ladegaard Skov. "We have participated in workshops in the USA and Europe and it is obvious that no single group can lift the whole research task. Of course we have to patent our best ideas, but generally there is a consensus on creating synergy."

While Ladegaard Skov's EAP research focuses mainly on areas like renewable energy, loudspeaker technology, and medical application, interaction with the designers from the Royal Academy of Fine Arts has given valuable feedback and inspiration.

"Mosse's interior design using EAPs points to ways that elements from nature can become interior design elements in innovative ways," says Ladegaard Skov. "And in her exhibitions, she shows the possibilities of these new materials in ways that appeal to the broader public."

FIGHTING BIOFOULING AND **CORROSION** WITH IMPROVED COATING RECIPES

Since coating science and engineering got a foot-hold at DTU Chemical Engineering in the late 90's, the area has evolved steadily. From the beginning, Associate Professor Søren Kiil has been a driving force in this field, cultivating new research territory on the basis of a series of successful projects. Most coating research at the department has been carried out in close cooperation with Hempel A/S and has primarily covered marine coatings for application on ship hulls, oil rigs, and the like. However, new research horizons are in sight as up-coming projects expand the focus to coatings for fire protection and wind turbine rotor blades.

The cooperation between Hempel and KT began in 1999 when Professor Kim Dam-Johansen, who at that time was also Group Vice President of Hempel, hired two former CHEC Ph.D.'s – Søren Kiil and Claus Weinell – to work on experimental testing and modelling of coatings for addressing the biofouling problem. In close collaboration with Hempel A/S the researchers started to develop and apply mathematical modelling tools and accelerated test methods.

From Antifouling to Anticorrosive Coatings

DTU Chemical Engineering contributed to this venture with unique mathematical modeling tools to understand the complex mechanisms of antifouling coatings in order to fit the varying needs of different ships or fleets, while at the same time reducing the release of biocides. In addition to work on theory and mathematical modeling, practical experiments were carried out with vertically positioned "ship simulators" where samples of different types of coating were exposed to seawater-like conditions and examined for their seawater behaviour. These so-called "rotors" were initially built at the workshop at DTU Chemical Engineering and later at Hempel's premises close by.

The scientific approach was a useful supplement to the more practical methods used by the industry. Since then, Søren Kiil has supervised a number of PhD projects within the coatings field. In 2006, Kiil started to work on anticorrosive coatings while simultaneously supervising a project suggesting a radical new approach in the antifouling area. In a collaboration with Danisco and Hempel, Kiil supervised a project by PhD student Stefan Møller Olsen, investigating the use of enzymes for antifouling purposes.

"The initial idea was to use starch particles as pigments," explains Kiil. "These particles carry enzymes which gradually transform starch into hydrogen peroxide which was thought might keep marine organisms away. However, our research showed that the concentrations of hydrogen peroxide needed for biofouling protection were too high for this purpose, but another useful property was discovered: we found that starch with enzymes could be used as a polishing pigment."

In the anticorrosion field, Kiil and students have developed complex tools that map the effect of physical and chemical parameters on industrial coatings. In 2010, PhD student, Per Aggerholm Sørensen, succesfully finished a project concerning the application of radical scavengers. The project examined causes for delamination as a result of damage to coatings. Kill explains:

"When, for instance, there is damage in a coating on a ship hull and seawater reaches the metal, the coating will loosen – delaminate – due to a complex

As the coatings engineering expert at DTU Chemical Engineering, Associate Professor Søren Kiil has carried out research and developed solutions in the field of anti-fouling and anti-corrosive paints. In future projects Kiil's research will include fire protection coatings and coatings for rotor blades on wind turbines.

interaction between diffusion phenomena and the corrosion process, adding to more and more corrosion over time."

Preventing Delamination with Radical Scavengers

"The PhD project examined what is actually happening. During our comprehensive studies, we read that free radicals and peroxides are formed during the delamination process," states Kiil, "These are very reactive molecules and pose a similar threat in the uppermost coating layer. Manufacturers add certain antioxidants – radical scavengers – to the top coating layer to prevent the formation of free radicals which is caused by ultraviolet light from the sun."

"We got the idea that maybe these antioxidants could also be added to the bottom layer, the primer. Basically we took an additive traditionally used in the uppermost layer and added it to the primer layer. No one tried this before, but it worked. In practice it is a powder that is added to the coating during formulation, and we found that only a small weight percentage is necessary," says Kiil.

Several PhD students, including Diego Meseguer Yebra, Stefan Møller Olsen, and Per Aggerholm Sørensen, have been employed by Hempel following their projects at DTU Chemical Engineering. While this testifies to the quality and benefits of Kiils strong involvement in the field it should be emphasized that over the years Kiil has carried out research activites in several other areas. He works with the pharmaceutical company Lundbeck on improving process design, and he is also involved in projects with the power plant industry related to flue gas cleansing.

”Process and product design” could be a headline for Kiil's versatile activities. As a member of the faculty at DTU Chemical Engineering, he teaches product engineering where his coatings expertise gives him a solid practical background. "I teach product design with a broad focus on multicomponent products, and coatings is an obvious example of this," says Kiil, who also arranges and teaches an external 5-days course for coating industry employees every second year.

While coatings science and engineering research at DTU Chemical Engineering has often pertained to objects submerged in water, its second decade may be dedicated to higher altitude subjects:

"We are about to launch projects related to fire protection coatings, surface protection that can maintain the mechanical properties of steel for longer time during a fire. Another upcoming research subject is coatings for rotor blades on wind turbines," says Associate Professor Søren Kiil.

Professor Jørn Dalgaard Mikkelsen heads research project seeking to produce Human Milk Oligosaccharides (HMO) by enzymatic catalysis:

DARWIN ON FAST-FORWARD
IN SCIENTIFIC HUNT FOR SUPER-SUGARS

"Just a spoonful of sugar helps the medicine go down," sang Julie Andrews in the popular 60ties musical Mary Poppins and for centuries that was probably the most positive anyone could say about the relation between sugar and medicine. But recent extensive research indicates that sugars found in human breast milk, Human Milk Oligosaccharides (HMO), have profound prebiotic properties. HMO's apparently acts as nature's own medicine as they 'nourish' the beneficial bacteria in the intestinal system of breastfeeding babies while preventing harmful bacteria from gaining a potentially deadly foot-hold. In 2010 the Danish Council for Strategic Research granted DKK 20 million (Total budget 36 million DKK) to a project aiming at producing these unique sugar molecules by an enzymatic process. Professor Jørn Dalgaard Mikkelsen from DTU Chemical & Biochemical Engineering heads the research activities and coordinates efforts between other involved partners at DTU and the external partners, Danisco A/S, Arla Foods, the University of Southern Denmark, University of Copenhagen (KU Life) and University of Reading, UK.

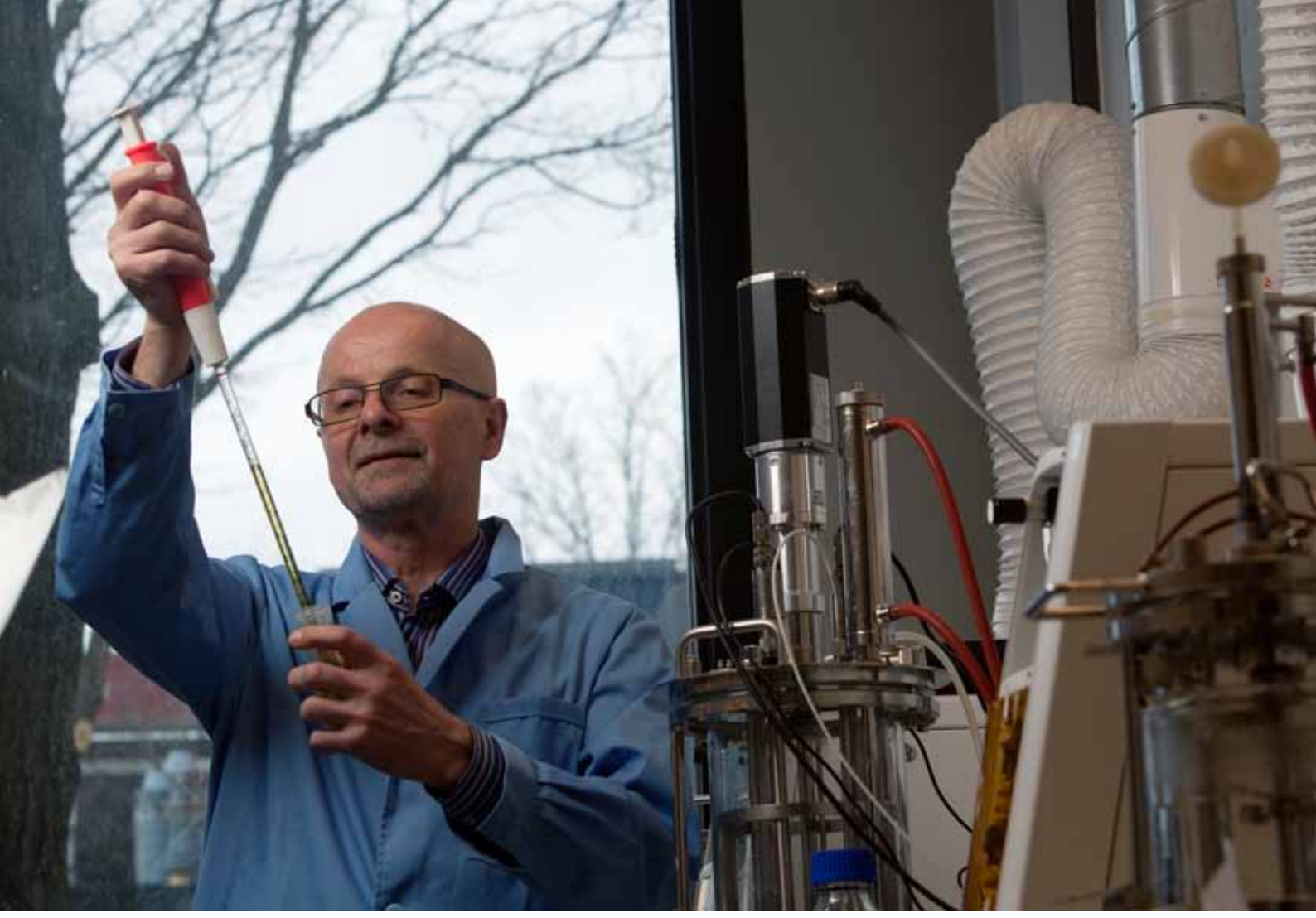
"HMOs are extremely potent sugars and have properties the like of which we have never seen in sugars before," says Mikkelsen. "They help to eliminate the potentially lethal threats posed to infants by pathogens like Campylobacter jejuni, Salmonella strains, Clostridium perfringens and Vibrio colera."

In infants that get milk from their mothers the HMO molecules act as decoys, preventing the pathogens from binding to mucosa cell walls in the human intestine from where they can enter the blood stream and spread potentially lethal toxins. Bacteria and viruses bound by HMO may be washed out of the gut system and simultaneously HMO promotes the growth of healthy bacteria, making them the ultimate health protecting sugar molecules.

Enzymatic Upgrading to Match Nature's Own

"It has been found that even the HIV virus binds to the HMO molecules," says Mikkelsen. "Transmission of HIV from infected mothers may therefore be reduced by breastfeeding with milk containing genuine HMO molecules. Ordinary infant formula products contain sugar molecules that are very different and less potent with respect to protective properties. When HMO molecules can be produced at a large scale, as a predicted outcome of our successful research, the recipe for the infant formula will change, contributing strongly to improved infant health. There are a number of exciting possibilities in this field, and we have only scratched the surface within the last year."

The goal of Mikkelsen's research group is to produce HMO by enzymatic upgrading of side-streams from the food and agricultural industries. The final product can be added to infant formula products, a field where the partner ARLA FOODS already has an important market, and HMOs could also be used for other prebiotic purposes. The aim and expectation is to produce HMOs that are chemically identical to nature´s own molecules.



"We are walking in Darwin's footsteps so to speak, using molecular evolution which is done a lot faster than in the origin of species way. We will end up with HMO molecules that are very similar or even identical to nature´s own molecules," says Professor Jørn Dalgaard Mikkelsen

"We will end up with some HMO molecules that are very similar or even identical to nature´s own molecules. The challenge is to see how far we can get – if we can only make milligrams of the substance that is interesting, but if we can make grams or kilograms that will be even better – and we're getting there. We have made progress by now, and from here we need to put modules together and produce the genuine HMO molecules."

In Darwin's Footsteps

Finding the genes that can produce the active enzyme is a complex chain of processes that begins with a quest for similar enzymes. "Basically there are two paths we can take," explains Mikkelsen.

"We can look for enzyme candidates in nature or submit queries to genome databases. The genomes from a number of fungi and other microorganisms have already been sequenced, and we use bioinformatics to identify particular amino acid sequences by comparing our samples to the millions of genes available in databases."

Mikkelsen elaborates, "Maybe we end up with 50 candidates, and some could be 70% similar to ours, while others may only be 30% alike, and from this pool we select specific enzymes we would like to try. The genes will be produced by chemical synthesis, a procedure we outsource to small startup companies to save time. We transform the yeast cells, and after a selection of cells with high enzyme levels, we produce the enzyme in a fermenter. A number of tests will be performed with the enzyme, to validate the performance and the quality of the designed oligosaccharides."

Mikkelsen and his team can even change the enzyme design at the molecular level to attain certain properties such as a higher temperature tolerance by changing specific amino acid residues in the enzyme.

"We do that by walking in Darwin's footsteps so to speak, using molecular evolution - which is done a lot fas-

The LEANGREENFOOD network (LGF) is another project Jørn Dalgaard Mikkelsen is currently engaged in. The LEANGREENFOOD network will use enzymes to extract and modify food ingredients based on starch, pectin and proteins. This will reduce the emission of chemicals such as nitric acid in the pectin industry, and limit the water and energy use in starch and protein refinery processes. Other partners in LGF are LMC - Centre for Advanced Food Studies, Denmark, Wageningen University, Netherlands, Agricultural University of Athens, Greece, Danisco France SAS, France, FOSS Analytical A/S, Denmark, DSM Food Specialties, Netherlands, Biosensores S.L., Spain.

PREBIOTIC CENTER

Jørn Dalgaard Mikkelsen is also engaged in research pertaining to e.g. dietary fiber molecules and oligosaccharides within the Strategic Research Center "Biological Production of Dietary Fibres and Prebiotics", headed by Professor Anne Meyer, DTU Chemical & Biochemical Engineering. Dietary fibres and prebiotics are non-digestible dietary carbohydrates that can be health promoting by supporting the growth of beneficial colonic bacteria and via other mechanisms. With support from "Biological Production of Dietary Fibres and Prebiotics" it was possible to establish a small enzyme factory to generate more than 100 mono-component hydrolytic enzymes. Using diversity screening the number has grown to more than 150 enzymes that make it possible to design unique prebiotic structures with enhanced functional activity.

ter than in the origin of species way," Mikkelsen states. "We usually outsource this service to small startup companies and they provide us with mutated enzymes or genes, which we validate in our yeast system. This is a matter of continually trimming the amino acid sequence

Outsourcing for Stronger Focus on Results

The HMO project's research budget includes 1 million DKK for outsourcing, an unusually high amount, but Mikkelsen underscores the importance of broad and flexible cooperation in this kind of biotech research, and this includes outsourcing of tasks like mass spectroscopy and genetic engineering.

"It is impossible to cover all the techniques and analytical tools needed for the project within the group," says Mikkelsen. "We could have five people working on genetic engineering and we would have to move very slowly, but by outsourcing some of the routine procedures our resources can be pushed forward to get the project moving."

Outsourcing is a research approach that Mikkelsen carried with him from his former position as Head of Department of Danisco Biotechnology in Copenhagen. At Danisco, Mikkelsen was responsible for the up-front pipelines and for developing new enzyme solutions for the Feed and Food Industry, including molecular evolution, gene discovery, selection, screening and expression of new lead enzyme candidates.

The strong foundation in industry gives Mikkelsen an advantage point also in terms of assessing the qualifications needed by future chemical and biochemical engineers. As biocatalysis gradually complements or replaces traditional chemical process the demand for suitably educated people is rising within biotech companies operating in food, pharmaceutical and enzyme fields alike.

"We have established some strong projects in very close cooperation with industry partners, giving PhD students an education which is teamed up and tuned to continue within the industry," says Jørn Dalgaard Mikkelsen. "We are already getting requests for PhD students who will be able to see the whole process from the beginning to the end and who are not afraid of jumping into step one, two, or three in the process chain, therefore having actual hands-on experience with all the different steps."

Since Arla Foods entered the chinese market in 2007 their activities in the infant formula field have expanded rapidly and China is currently the company's main focus market for child nutrition products. Arla Foods cooperates with China's biggest dairy company, Mengniu, the latter contributing with its solid market insight and organisation for product distribution, while Arla Foods has been in charge of the building of factory facilities based on state-of-the-art Danish technology. "The HMO project is focusing directly on one of our key research areas," says Preben Bødstrup Rasmussen, R&D Director at Arla Foods, "it is a very ambitious long term project, but we are confident that our collaboration with strong partners both in academia and within Danisco will ensure a positive outcome."

Associate Professor Nicolas von Solms brings thermodynamics, cryobiology, and polymer science together in a quest for bio-degradable gas hydrate inhibitors for use in the oil industry:

TAKING GAS HYDRATE RESEARCH FROM LAB TO PRODUCTION

Gas hydrate formation in subsea pipelines is a major challenge to the oil industry, as these formations can potentially halt production flow and cause security hazards. Oil companies prevent the ice-like gas hydrates from forming by adding antifreeze agents like Methanol, Glycol, or polymer-based inhibitors but this is both a costly and ecologically hazardous solution. Since 2007, Associate Professor Nicolas von Solms has been committed to the investigation of gas hydrate formation and the quest for bio-degradable alternatives. In 2010, von Solms broadened his activities in the field, on the basis of promising research into antifreeze proteins from arctic fish and insects. These proteins may offer bio-degradable alternatives for the existing gas hydrate inhibitors. New research projects outlined by von Solms look at different ways to refine and scale-up production of eco-friendly gas hydrate inhibitors.

Gas hydrates are ice-like crystals that form when conditions of high pressure and low temperature are present in transmission pipelines used by the oil industry. Billions of DKK are spent each year on anti-freeze agents which are added to reservoir-fluids in the pipelines to prevent considerable damage the gas hydrates can cause to pipes, pumps, etc. As a thermodynamic researcher, specializing in oil and gas, Nicolas von Solms initially entered the gas hydrate research area to analyze the equilibrium of production chemicals in oil, water, and gas.

Chemical Versus Kinetic Inhibitors

"The chemicals that are added to prevent gas hydrate formation pollute the environment, and you will also find small amounts of these chemicals in the hydrocarbons produced," explains von Solms. "These aspects have to be understood, so in 2007, we started experiments to measure how these so-called production chemicals were distributed between oil, water and vapor. We became interested, however, in another way to stop gas hydrate formation which is not a thermodynamic method: Adding small amounts of polymers that act as kinetic inhibitors."

"These inhibitors slow down the formation of gas hydrates, and they just have to do that long enough to prevent formation of ice in the pipe. This means that instead of using a ton of methanol you can use 100 g of some polymer with equal effect," says von Solms.

Polymer-based gas hydrate inhibitors can be produced relatively cheaply and are already being applied in locations like the Gulf of Mexico and the Persian Gulf. However, the low bio-degradability of these inhibitors has prompted regulators in some countries to ban them from use (for example, they are not utilized in the North Sea). In 2007, PhD student Lars Jensen started a project supervised by von Solms and Associate Professor Kaj Thomsen, looking for environmentally friendly kinetic gas hydrate inhibitors. Lars Jensen was doing initial research based on proteins from the arctic eelpout when he became aware of research done by Professor Anders Løbner-Olesen and Professor Hans Ramløv at Roskilde University. Lars Jensen contacted Ramløv, an expert in extreme biology, freezing, and polar exploration whose research group had isolated antifreeze proteins that allow the larvae of the longhorn beetle (Rhagium mordax) to be exposed to temperatures as cold as -15 degrees Celsius without the bodily fluids freezing.

Taking Successful Research to the Next Step

"Some species of fish and insects possess an antifreeze protein which enable them to survive when the temperature drops below zero," says von Solms. "We wanted to see if we could use these proteins to prevent gas hydrate formation, and Lars Jensen's project showed that they have a better effect than traditio-

Associate Professor Nicolas von Solms (bottom left) came to the center IVC-SEP as a PostDoc in 2001 and has been a faculty member since 2005. The other Faculty members on the photo are Associate Professor Alexander Shapiro (left), Professor Georgios Kontogeorgis (center), and Associate Professor Kaj Thomsen.

nal inhibitors. Antifreeze proteins from fish are quite readily available, but Lars Jensen's project showed that antifreeze proteins from the Longhorn Beetle are even more potent."

While Lars Jensen's project yielded some very promising results, the beetle proteins are currently not available in large amounts. Thus, von Solms has subsequently initiated projects aimed at taking this research further with Lars Jensen continuing his research into environmentally friendly gas-hydrate inhibitors as a postdoc at DTU Chemical Engineering. One of the current goals is to produce the proteins in an organism by a fermentation process.

"The hope is that we can later scale-up production so we can end up with reasonable, gram amounts of this protein, produced in fermentation rather than extracting them directly from insects," says von Solms, who continues to work with the cryobiologists in Roskilde on the biological aspect of the project.

Another direction of this research is to see if it's possible to change the protein using various biochemical techniques to make it more effective.

"One of the limitations is that we only have the protein available in very small amounts. We need to test it in realistic conditions, like in a flowing pipe, so it is important that we scale up the biochemical process," says von Solms.

The hydrate research is supported by grants from FTP and through a HTF project with DONG Energy, Mærsk Oil and Gas, and Novozymes as partners

A Different Polymer-Based Approach
Another branch of the gas hydrate research centers on a master degree project, co-supervised by von Solms and Søren Hvilsted from the Danish Polymer Center (DPC) at DTU Chemical Engineering.

von Solms explains:
"We are taking some of the polymer types that have been used for gas hydrate inhibition but are not biodegradable. In collaboration with Professor Hvilsted, we try to synthesize polymers that have the same functionality but are also biodegradable. The crucial point is to reach large scale production at low cost. While this projects is still in its very early stages, I believe there could be some rewards waiting in this collaboration."

Nicolas von Solms came to what was then the IVC-SEP Center (today CERE) as a PostDoc in 2001, and, among other projects, worked with professors Georgios Kontogeorgios and Michael M. Michelsen on various incarnations of the PC SAFT tool for a number of years. von Solms became a member of the DTU Chemical Engineering faculty in 2005, and has subsequently been engaged in research projects spanning a range of research fields, including e.g. Statistical Mechanics, post-combustion CO_2 Capture, and Enhanced Oil Recovery. The CO_2 capture area also has a link to current gas hydrate research, and von Solms supervises a PhD student, Peter Jørgensen Herslund, who is involved in a European project investigating whether gas hydrates might work with something called a promoter as a way to capture CO_2.

"Usually we try to find ways to stop gas hydrates, but this project indicates a reason you might want to keep them. If you can make a gas hydrate out of a flue gas, you can use it to absorb the CO_2 and filter it off the flue gas," says Nicolas von Solms.

GREENER AND LEANER FUEL PRODUCTION VIA CATALYSIS, PYROLYSIS AND MICROREACTORS

Renewable energy for transport along with the use of biomass and CO_2 neutral fuels in the power and cement industries have been a key research area at DTU Chemical Engineering for years. To complement these, several new projects and collaborations were launched in 2010.

Concerns about CO_2-emission, hikes in oil and gas prices, and insecure energy supplies have boosted the global demand for fuels from renewable resources. The quest for sustainable, competitive, and efficient fuels and production methods will continue during the years ahead. Creating fuels for transport from biomass is one of the main challenges facing society, and a range of different production methods are under investigation. Professor Anker Degn Jensen from the CHEC research center, DTU Chemical Engineering, heads the Fuel Synthesis from Syngas area within the research platform CASE (Catalysis for Sustainable Energy), a collaboration spanning eight DTU Departments, with the aim of developing catalysts and catalytic processes for cheaper and more efficient use of renewable energy sources. Within the CASE framework, Professor Jensen looks at new ways for creating fuels from biomass along two routes. One route is based on gasification of biomass which has the advantage that all types of biomass can be used. Once biomass has been converted to syngas, consisting primarily of CO and hydrogen, the challenge of the second route is to convert the gas into other fuels, such as higher alcohols, using optimal catalytic technology.

From Pyrolysis to Microfactories

An alternative route to fuels is based on pyrolysis of biomass to produce bio-oil. This method has the additional advantage of being able to utilize most types of biomass, but the produced oil needs to be upgraded in order to enhance the stability and heating value of the oil before it can be used as a fuel for vehicles. At the department, research is ongoing to optimize both the pyrolysis process and to find suitable catalysts for upgrading the oil by hydrogenation. The required hydrogen can be obtained by steam reforming or partial oxidation of a fraction of the bio-oil. These methods are being investigated in another project.

Enzymatic catalysis is an essential part of the biochemical approach to the conversion of biomass for fuel, and the trend toward greener processes results in a constantly increasing number of industrially relevant biocatalytic processes. Research in enzymatic production of biodiesel has been ongoing at the PROCESS center at DTU Chemical Engineering since 2008, and in 2010 funding was granted for the project "Novel greener and lean processes using integrated microfactories." This project now aims at investigating a novel approach to the production of enzymes by using microreactors.

Enzymes for biocatalysis are most often produced in large industrial-scale fermentation processes, and are typically shipped to the customer following a number of expensive and inefficient downstream operations. The microfactory approach suggested by Professor John Woodley and Associate Professor Krist V. Gernaey aims to demonstrate that fermentation and biocatalysis can become an integrated process, thereby eliminating the expensive downstream operations needed to purify the enzyme. The result is expected to be a cheaper biocatalyst, as well as a greener and more efficient process.

Power Generation from Renewable Energy

DTU Chemical Engineering has been collaborating closely with power plants on the topic of harmful emission con-

The pilot plant at DTU Chemical Engineering houses a broad range of experimental facilities related to renewable energy research. In the picture PhD student Anders Rooma Jensen is pushing different kinds of bio-fuel into an oven operating at around 1000 °C and simulating the rotary kilns used in cement production. Rooma Jensen's research is one of many projects carried out in the context of the 'New Cement Production Technology', a research platform launched in 2007 where DTU Chemical Engineering, FLSmidth A/S and the Danish National Advanced Technology foundation join forces to develop cleaner and more energy efficient cement production methods.

trol since the mid 80's, and within the last decade the department has expanded its collaboration with strong activities in the field of biomass fuels. At the end of 2010, these activities were expanded even further when the Danish Agency for Science, Technology and Innovation gave a 35 million DKK grant to the new research platform "Power Generation from Renewable Energy" (GREEN). GREEN, headed by Professor Peter Glarborg of DTU Chemical Engineering, is a broad international research platform focusing on optimizing the efficiency of biomass use at power plants. The typical ratio between coal and biomass in pulverized fired power plants is currently 80% coal to 20% biomass, but the goal is to reach 100% biomass firing, with the related challenges being investigated by a host of GREEN partners. Besides DTU Chemical Engineering, other partners are DTU Mechanical Engineering, DTU Risø, Aarhus University, Lund University, Stanford University, University of North Texas, HNE Eberswalde, B&W Energy, DONG Energy Power, and Vattenfall.

In a related project, Associate Professor Peter Arendt has partnered with DONG A/S and Risø DTU to test a 6 MW Fluidized Bed Gasification System. The so-called LT-CFB gasifier, which was originally invented by Peder Stoholm from Danish Fluid Bed Technology, is being tested at the Asnæsværket power plant outside of Kalundborg. The LT-CFB gasifier is extremely flexible and allows for the use of straw and other high alkali biomases that formerly caused trouble in power plant boilers. The DTU Chemical Engineering portion of the project teams with Risø DTU to examine the behavior of the ash in the LT-CFB reactor and, in particular, to investigate the behavior of the alkali metals.

Intelligent Heat Systems

Residential wood combustion is one of the important renewable energy sources in Denmark, making it an area with a large potential for improvement. In 2010, DTU Chemical Engineering started a collaboration with HWAM A/S on the project "Intelligent Heat System – high energy efficient wood stoves with low emissions." The project aims to develop and demonstrate the next generation of wood stoves through the development of a tight collaboration between a research centre and industry.

Wood stoves have the potential of providing CO_2 neutral energy without transmission losses, but with the significant drawbacks of high emissions of particulate matter close to homes and an uneven heat release profile, giving non-optimal heat comfort. The aims of the project are to develop, test, and market a system for a digital control of the combustion process, and furthermore, to develop and demonstrate an improved design for a woodstove combustion chamber. Both the control technology and the combustion chamber will be marketed as generic components for use in many wood stove designs.

The synergy and good interaction between CAPEC and PROCESS make them the ideal collaboration partners, agree Associate Professors Krist V. Gernaey (left) and Jens Abildskov.

SCIENTIFIC SYNERGY AND GOOD NEIGHBORS

The two centers, CAPEC and PROCESS, have been collaborating closely since the latter was officially started in January 2010. Speaking from their different scientific platforms, two of the new "neighbors," Associate Professor Krist V. Gernaey, PROCESS, and Jens Abildskov, CAPEC, see a lot to be gained from sharing resources and knowledge.

"It is nice to have the experts in computer-aided methods and tools next door – we can just go and ask if we have a problem," says Gernaey, whose main research areas within PROCESS are PAT and continuous pharmaceutical production, micro-reactors for biological applications, and population dynamics of microorganisms.

Where CAPEC specializes in development of computer-based methods and tools to support process modeling, system design, and control of processes, PROCESS focuses on laboratory and pilot scale experimental evaluation of processes based on chemical, enzymatic, and whole cell catalysis.

"In very general terms you could say that CAPEC is primarily focused on the use of computers, where PROCESS is more experimentally oriented," says Jens Abildskov, who has been a member of CAPEC since the center started in 1997. Abildskov's main area within CAPEC is mathematical modeling and prediction of product properties.

In 2010, Gernaey collaborated with Professor and head of CAPEC, Rafiqul Gani, and Associate Professor Gürkan Sin, CAPEC, in areas like design of PAT systems for continuous pharmaceutical production, modeling of crystallization processes, uncertainty and sensitivity analysis, and multi-scale models for bioprocesses. Jens Abildskov was involved with Professor and Head of PROCESS, John Woodley, and Postdoc Mathias Nordblad in projects related to biodiesel and molecular design.

"The obvious advantage is that we can use CAPEC's design methods, and CAPEC, in turn, gets feedback about how things work from us," says Gernaey. Abildskov adds, "Besides the everyday social interaction we get from sharing a tea kitchen, we went on a picnic together. And we now also share the annual meeting."

In 2010, the former CAPEC Industrial Consortium was renamed "the CAPEC-PROCESS Industrial Consortium." The Consortium currently has 31 member companies representing several areas of chemical engineering.

"CAPEC has traditionally been associated with the classical chemical industry, mostly in the petrochemical area," explains Abildskov. "In recent years, CAPEC has become increasingly involved with pharmaceutical, agrochemical, food, and biochemical industries. Since PROCESS and CAPEC often work with the same companies, it was an obvious choice to form a joint consortium."


HOT

ORGANIZATION

DPC

CHEC

CAPEC

BIOENG

PROCESS

CERE

Administration & Technical Support

At the Danish Polymer Center we are devoted to the application of molecular design, synthesis and processing of polymers to create materials and products with unlimited ranges of properties and applications. We strive towards this goal in a balanced environment of education, research and industrial cooperation.

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DPC

THE DANISH POLYMER CENTER

The Danish Polymer Center is devoted to fundamental research in polymers, soft materials, and complex fluids. The aim is to utilize polymer research in education, technological innovation and industrial collaboration. Organized within the Department of Chemical and Biochemical Engineering, the Center is located in newly refurbished laboratories in Building 227. The research is interdisciplinary ranging from chemical synthesis, chemical and physical characterization of polymers and soft materials, to fluid mechanics of complex fluids.

Equipped with state of the art instrumentation for polymer characterization, the laboratories at the DPC provide a common ground for polymer chemists, polymer physicists and chemical engineers. Current techniques include the synthesis of polymers with controlled molar mass, branching structure and functional groups, application of scattering methods for study of complex polymer systems, rheological characterization, and the design of multi-phase systems.

MSc in Polymer Engineering
Students in the DTU Master's Program in Advanced and Applied Chemistry may specialize in Polymer Engineering. This will allow master students to be trained in our laboratories and to engage in research at DPC.

Research Consortium in Polymers at DTU
The basic purpose of this consortium, established in 2006, is to ensure both stability and continuity of contact and communication between the Polymer Center at DTU and the parts of Danish industry that commercially use polymers. The consortium will run a number of smaller research projects and will serve as a greenhouse for conceiving ideas and innovating plans for future research and educational initiatives.

Graduate School Program in Polymer Science
Initiated in 2003, the Graduate School of Polymer Science is a research education network between the Department of Chemical and Biochemical Engineering at DTU, the Department of Chemistry at Aarhus University, Risø National Laboratory, and other associated industrial companies.

Financial support
Financial support to the DPC is provided by the Danish National Research Council, the European Union, the members of the Research Consortium in Polymers, and the members of the Graduate School in Polymer Science.

Members of the Graduate School Program of Polymer Science are as follows

- Coloplast A/S
- Elektro-Isola A/S
- Grundfos A/S
- Novo Nordisk A/S
- Radiometer Medical ApS
- Teijin Twaron

Members of the Research Consortium in Polymers are as follows

- Alfa Laval Nakskov A/S
- Coloplast A/S
- Dana Lim A/S
- Dyrup A/S
- Grundfos Management A/S
- Hempel A/S
- Novo Nordisk A/S
- Radiometer Medical ApS
- Rockwool International A/S
- Tetra Pak Packaging Solutions AB

Members of the CHEC Center
Professor Anker D. Jensen (left)
and Professor Peter Glarborg

A vital part of our research is conducted in very close collaboration with industrial enterprises and international research organizations. The industrial relations cover close joint projects with a mutual exchange of staff and cooperation on experimental research ranging from microscale over pilot plants to full-scale industrial production plants. This approach ensures high relevance of our research and efficient exchange of technology, know-how and know-why.

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CHEC

COMBUSTION AND HARMFUL EMISSION CONTROL – THE CHEC RESEARCH CENTER

CHEC is a research center mainly focused in the field of Chemical Reaction Engineering and Combustion, emphasizing high-temperature processes, formation and control of harmful emissions catalysis, particle technology, and product design.

The research approach involves a combination of modelling and experimental work. Experiments are conducted over scales ranging from small laboratory reactors to full-scale industrial units.

The models typically combine a generic description of the chemical reaction system with a process-specific flow description. They are used to analyze and extrapolate the experimental data as well as providing input for design and optimization.

The work is conducted in collaboration with enterprises and a range of national and international research organizations. The field of Product Design covers quantitative formulation engineering using traditional chemical engineering methods in the design of products such as granular enzymatic products, and controlled release systems, in many different fields like advanced coatings.

Waste fuel utilization, methods to reduce CO_2 emissions, and production of liquid fuel from biomass have received increasing attention in the CHEC Research Center over the last years. The work conducted there is directed towards pyrolysis of biomass, oxyfuel combustion, gasification, catalytic synthesis of methanol and higher alcohols, methanol and bio-ethanol production, as well as fuel cell technology.

The CHEC Research Center collaborates mostly with the following industrial partners

- Babcock & Wilcox Vølund ApS
- B&W Energy A/S
- Danish Gas Technology Center A/S
- Dong Energy A/S
- Energinet.dk
- F.L. Smidth A/S
- H. Lundbeck A/S
- Haldor Topsøe A/S
- Hempel A/S
- Hwam A/S
- MAN Diesel A/S
- Novozymes A/S
- Topsøe Fuel Cell A/S
- Vattenfall A/S

The industrial support is supplemented with funding from these organizations

- DTU
- Nordic Energy Research
- The Danish Council for Technology and Innovation
- The Danish Research Training Council
- The European Union
- The Public Service Obligation Programme
- Danish National Advanced Technology Foundation
- The Energy Technology Development and Demonstration Program (EUDP)
- The Danish Council for Strategic Research (DSF)
- The Danish Ministry of the Environment, Environmental Protection Agency

Briefly, the research objective of CAPEC is to develop computer aided systems for process simulation, process/product synthesis, design, analysis, and control/operation that is principally suitable for the chemical, petrochemical/oil, pharmaceutical, food and biochemical industries.

Our computer-aided systems are developed on the basis of fundamental modelling studies that incorporate estimation of thermophysical and phase equilibrium properties as well as description of the underlying phenomena and behavior of the processes and operations. We manage the complexity related to the solution of a wide range of product-process development problems in product and process engineering and contribute to innovative and sustainable technologies.

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CAPEC

COMPUTER AIDED PROCESS-PRODUCT ENGINEERING CENTER (CAPEC)

The CAPEC research center applies a systems engineering approach to develop comprehensive solutions to various industrial problems based on a thorough analysis of scientific issues and actual product/process requirements. The developed systematic methods are generic in character and therefore applicable to a wide range of problems in traditional chemical and petrochemical industries as well as to solving problems in emerging areas including life sciences (nutrients, health, medical sciences, biotechnology, biofuels), pharmaceutical industry, food industry, energy, and enterprise-wide optimisation.

Additionally, the systems approach enables CAPEC to convert the developed methods into software tools for problem analysis and solution. Thus, the research at CAPEC has resulted in the development of a range of generic model-based techniques and their conversion into state of the art computer-aided tools for modelling, synthesis, design, operation, control, and analysis – each method dedicated to systematic and efficient process-product engineering.

The research at CAPEC is organized into six research programs within a logical framework ranging from fundamental to applied research. Based on the fundamental modelling at the generic levels, computer-aided methods and tools are developed at the next (intermediate) levels for synthesis, design, analysis, and control of process/product/operation. Again, these models, methods and tools are integrated in the final research levels, where end-user solutions are generated for the development of cleaner, safer, innovative and sustainable technologies.

Headed by Professor Rafiqul Gani, the CAPEC research center constitutes a very distinct group of professors and associate professors, researchers, post-docs, and PhD students that contribute to the joint activities of DTU Chemical Engineering. Members of two research groups (Systems Engineering and Process Technology within DTU Chemical Engineering) now contribute to the products and services offered by CAPEC. Additionally, CAPEC usually hosts around ten MSc and BSc students plus a varying number of visiting students and international visitors.

In 2010 CAPEC was supported by the following industrial consortium

- Akzo-Nobel (NL)
- Alfa Laval A/S (DK)
- AstraZeneca (S)
- BASF (D)
- Bayer AG (D)
- Borealis Polymers Oy (SF)
- ChemProcessTechnologies (USA)
- Céondo Ltd. (UK)
- Cognis (D)
- ConocoPhilips Company (USA)
- Danisco A/S (DK)
- DSM (CH)
- DuPont (USA)
- Firmenich (CH)
- FLSmidth Automation (DK)
- FMC Corporation (USA)
- GlaxoSmithKline (USA)
- Huntsman Europe (NL)
- Invensys SimSci-Esscor (USA)
- Kongsberg Oil and Gas (NO)
- Mitsubishi Chemical Corp. (JPN)
- Neste Oil (SF)
- Novozymes A/S (DK)
- Optience (USA)
- Petrobras (Brasil)
- Processium (F)
- ProSim (F)
- SCG Chemicals Co. Ltd. (TH)
- Syngenta (UK)
- Unilever (USA)
- VTT Technical Research Centre of Finland (SF)

The goal of the Center for BioProcess Engineering is to create a strong link between generic chemical engineering research and the industrial application of biotechnology.

The vision of the Center is to provide new knowledge led principles for designing new, biobased production processes and products. At the same time, the objective is to hatch top-qualified M.Sc. and Ph.D. candidates through research based teaching and supervision. We hope that this twofold strategy will contribute to fulfilling the potential of biotechnology to substantially impact industrial production and thereby contribute to development of new, ingenious, and sustainable processes and products.

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BIOENG

CENTER FOR BIOPROCESS ENGINEERING

The purpose of the Center for BioProcess Engineering is to strengthen the integration of chemical engineering research with biotechnology via a focused research effort linking generic chemical engineering science with industrial applications of biotechnology. The Center operates at the interface between biotechnology and chemical product and process engineering with a particular research focus on processes involving biocatalytic reactions, and thus the research discipline Enzyme Technology. The research has been structured into four research subjects: **1**) Enzyme Discovery and Cloning; **2**) Enzyme Assays and Kinetics; **3**) Enzyme Reaction Design; **4**) Reactor Design and Separation Technology. With transverse subject areas of enabling technologies: A)Enzyme production; B) Analytics.

The Center for BioProcess Engineering hosts three larger research structures:

The Novozymes BioProcess Academy was established in 2002 with substantial support from Novozymes A/S. The overall mission of the Academy is to strengthen the integration of chemical engineering, processing technology, and biotechnology. The Academy has educated 15 post-graduate students for the qualification of Ph.D as well as 8 MSc students.

Center for Biological Production of Dietary Fibres and Prebiotics was established in 2007 via a grant from The Danish Council for Strategic Research. The research focus is on developing bioconversion processes and the objective is to design high value carbohydrate products having potential health benefits.

The Human Milk Oligosaccharides Programme was initiated in 2010 as a larger research effort on a grant from The Danish Council for Strategic Research. The research concerns the enzymatic design of bioactive human milk oligosaccharides and takes place in collaboration with industrial and academic partners, notably Arla Foods amba, Danisco A/S, University of Reading; Southern Danish University, Copenhagen University, and DTU Chemistry.

The Center for BioProcess Engineering also participates in the EU ITN Programme LeanGreen Food involving education of 13 PhD students, 4 of them enrolled at DTU.

The majority of the above listed activities involve collaboration across different DTU departments and with industrial partners. The vision of the Center for BioProcess Engineering is to contribute to establish DTU as an exceptionally strong environment for interdisciplinary research and education within all aspects of BioProcess Engineering, notably new and innovative enzyme processes.

Center for BioProces Engineering currently collaborates with the following industrial partners

- Arla Foods Amba
- Chr. Hansen A/S
- Danisco A/S
- Foss Analytical A/S
- Grundfos A/S
- Lyckeby Stärkelsen Amba (Sverige)
- Novozymes A/S
- Novo Nordisk A/S

"The vision of the Center for Process Engineering and Technology is to provide the necessary support to enable the next generation of processes to be implemented in industry. In this way, the new developments in biotechnology, catalysis and separation science alongside process engineering can be translated into industrial practice. New processes with reduced waste, high efficiency, and based on all the principles of sustainability can be developed which will help develop the European industrial sector in the production of chemicals, bio-based materials and chemicals, as well as pharmaceuticals"

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PROCESS

CENTER FOR PROCESS ENGINEERING AND TECHNOLOGY

The Center for Process Engineering and Technology is focused on the development of new and innovative processes for industry. PROCESS works at the interface of a number of disciplines, including biotechnology, process engineering and chemistry. The objective is to provide the necessary infrastructure and support to evaluate and implement the next generation of processes in the chemical, bio-based and pharmaceutical sectors in particular. The research is carried out in close collaboration with industry and work is carried out at three levels, namely: laboratory scale experimental process evaluation; model based evaluation of process technology and pilot-scale process validation. Two demonstration units operate in the pilot facilities, one for immobilized enzyme reactions and the other for organic synthesis. Using the results from work at the three levels enables new technology and processes to be evaluated both experimentally and also from the perspective of implementation. The Center is involved in the following large collaborative projects in Denmark and in Europe:

Bio-petrochemicals is a project established in 2007 with the Danish National Advanced Technology Foundation, DTU Chemistry and Novozymes A/S. It is focused on providing a new route to monomer building blocks from sugars such as glucose to enable an alternative route to chemicals from fossil fuels. *Sustainable Biodiesel* is a project established in 2008 with the Danish National Advanced Technology Foundation, DTU Management, Novozymes A/S, Aarhus University and Emmelev A/S. It is focused on developing a new enzymatic route to biodiesel.

Towards Robust Fermentation Processes by Targeting Population Heterogeneity at Microscale is a project established in 2009 with the Danish Council for Strategic Research, DTU Systems Biology, DTU Fotonik, Department of Biology (University of Copenhagen), Department of Biotechnology, Chemistry and Environmental Engineering (Aalborg University), Crystal Fibre A/S, Fermenco ApS and Foss A/S. It is focused on characterization and control of the heterogeneity of a population of microorganisms in a fermentation.

In the pharmaceutical sector several projects sustain the development of the next generation of enzyme based methods for the synthesis of optically pure molecules (including AMBIOCAS, BIOTRAINS funded by the EC). The Center is also involved in a 5-year project with Lundbeck, aiming at moving from batch towards continuous production, and is a partner in the F3 European consortium established in 2009. The main focus of F3's activities is the development of early stage pharmaceutical leads in collaboration with AstraZeneca Ltd.

The PROCESS Research Center collaborates primarily with the following industrial partners

- AstraZeneca Ltd (UK)
- BioSilta Oy (SF)
- Bioingenium SL (ES)
- Britest Ltd (UK)
- CLEA Technologies BV(NL)
- c-Lecta GmbH (D)
- Crystal Fibre A/S (DK)
- Emmelev A/S (DK)
- Evonik Industries AG (D)
- Fermenco ApS (DK)
- Foss A/S (DK)
- Haldor Topsøe A/S (DK)
- Ingenza Ltd (UK)
- Novozymes A/S (DK)
- Royal DSM NV (NL)

CERE members at DTU Chemical Engineering (from left) Associate Professor Nicolas von Solms, Associate Professor Alexander Shapiro, Associate Professor Kaj Thomsen and Professor Georgios Kontogeorgis

For more than 30 years the Center for Energy Resources Engineering (CERE) has been a leading research group in the area of applied thermodynamics (previously known as IVCSEP). In close collaboration with industry, relevant authorities and international research organizations, the scientific results from CERE are implemented in industrial products and processes.

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CERE AT DTU CHEMICAL ENGINEERING

CENTER FOR ENERGY RESOURCES ENGINEERING

CERE is a dynamic research group with an excellent track record and international reputation in the areas of applied thermodynamics, transport processes, and mathematical modeling. With eight tenured faculty members the center covers several topics with both experimental and theoretical research.

The main activities of the center are in the areas of complex solutions (including polymers, electrolytes, peptides, and associating chemicals), nonequilibrium thermodynamics (diffusion and thermo diffusion), petroleum chemistry at the molecular level, and finally simulation of petroleum recovery processes (from the pore to reservoir scale). Furthermore, the center is active in several research projects of strategic importance such as CO_2 capture and storage and Enhanced Oil Recovery (EOR).

The Industrial Consortium of the center has existed for 30 years and continues to be a valuable asset for research and education at DTU. Many companies financially support research projects as well as hold the membership. For instance, the Chemicals in Gas Processing project (CHIGP) which is extensively sponsored by industrial partners (Statoil, Gassco, DONG Energy, BP and Maersk Oil).

Furthermore, in 2010 the center participated in a new major effort on the use of CO_2 for EOR in the Danish North Sea. This was a collaboration with DONG Energy, supported by The Danish National Advanced Technology Foundation, and the results attracted extensive media attention and new interesting collaborations on the subject. A rapidly growing activity is the research concerning post-combustion CO_2 capture. Within this area, the center is involved in several projects in collaboration with e.g. Vattenfall, and extensive EU collaborations.

In 2010 CERE was also granted two large projects from the Danish Advanced Technology Foundation to take off in the beginning of 2011. The first project, BioRec – Biotechnology in Oil Recovery – is a unique partnership between oil and biotechnology, represented by Maersk Oil and DONG Energy, and Novozymes, respectively. The second project is a partnership between CERE and the Danish sonar company, Reson A/S. This project aims to develop a model for oil-polluted sea water and from there, a state-of-the-art sonar product with an effective method for the detection and quantification of oil in sea water.

Over the years many students have benefited from the close contact with Danish and international industry through projects with CERE.

In 2010 the Industrial Consortium consisted of the following members

- Akzo Nobel (NL)
- BP (UK)
- Chevron (USA)
- Conocophillips
- DONG Energy A/S (DK)
- Eni (I)
- ExxonMobil (USA)
- GASSCO (N)
- GDF-SUEZ (F)
- Haldor Topsøe (DK)
- Linde (D)
- Mærsk Olie og Gas A/S (DK)
- Petrobras (BRA)
- RWE (D)
- Saudi Aramco (Saudi Arabia)
- Schlumberger (USA)
- Shell (NL)
- Sinopec (China)
- SQM (Chile)
- Statoil (N)
- Total (F)
- Vattenfall A/S (S)
- Welltec (DK)
- Lloyd's Register ODS (CAN)
- IFP (F)
- OMW (AUS)

Our support units provide important services for students, teachers and researchers and are responsible for the full array of technical and administrative functions at the department.

You will find some remarkable people working as support staff at the Department of Chemical and Biochemical Engineering. Our team enjoys its work and benefits from relationships marked by trust and team spirit, both within our department and with our colleagues throughout the Technical University of Denmark.

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ADMINISTRATION & TECHNICAL SUPPORT

SUPPORT STAFF

INNOVATIVE TEACHING, RESEARCH AND CONSULTING REQUIRE THE SUPPORT OF PROFESSIONAL SERVICES. OUR HIGH-QUALITY SERVICES ENABLE US TO DELIVER EXCELLENT EDUCATION AND PROJECT WORK. WORKING IN OUR SUPPORT UNITS MEANS BEING A STRONG PARTNER FOR OUR STUDENTS, TEACHERS AND RESEARCH TEAMS, AND ACCOMPANYING THEM THROUGHOUT ALL PHASES OF THEIR WORK.

ADMINISTRATION

Efficient support from our people in the administrative functions plays an important role within our department. We provide services in many different areas, including project administration, contracts, facility management, education, personnel and general administration.

CORPORATE COMMUNICATION

Our webeditor ensures that our website meets our high standards with respect to design and business communication, and writes up the latest company news in our corporate website and annual reports.

SERVICE AND PLANNING

The secretaries are the first point of contact for students, partners and colleagues alike. They handle a multitude of inquiries, information, and tasks and they play a major role in ensuring that a wide range of internal processes run smoothly.

INFORMATION TECHNOLOGY SERVICES

The focus of this unit is knowledge management (databases), IT consulting, IT solutions and support which include ordering, installing, and configuring hardware and software, as well as maintaining the IT back office.

WORKSHOP

Craftsmanship and innovation go hand in hand when the workshop at the Department provides our small and large scale laboratories with custom made, high quality equipment.

LABORATORIES

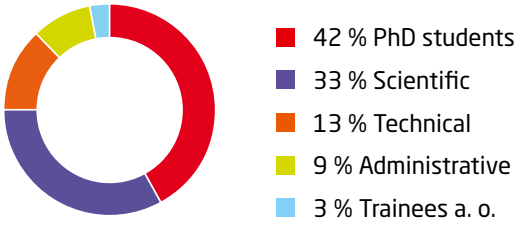
Our laboratory technicians ensure high safety standards and efficient caretaking of our laboratories and education and research facilities.

PRODUCTIVITY

STAFF 2010

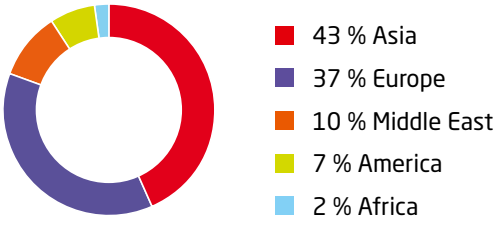
TYPE OF STAFF

(Total 229 persons)



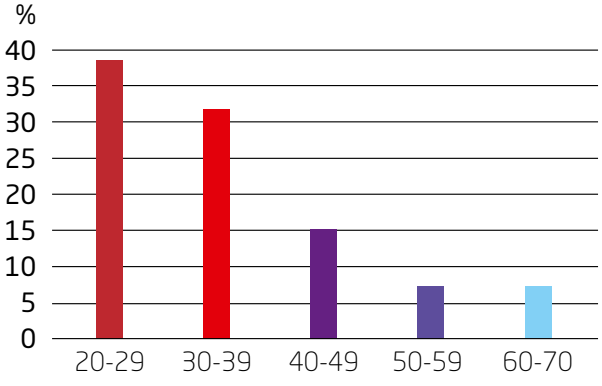
FOREIGN SCIENTIFIC STAFF

(Total 99 persons)



STAFF DISTRIBUTED BY AGE

(Total 229 persons)



PRODUCTIVITY

TEACHING & EDUCATION 2010

STUDENTS, EDUCATIONAL RESOURCES AND -IMPACT

Students in total (STÅ*)	**186**
Completed BSc projects	**25**
Completed MSc projects	**38**

* One STÅ is the equivalent of one student studying full time in a year

RESEARCH & INNOVATION 2010

Scientific publications with referee	**133**
Contributions to conference proceeding	**27**
PhD theses	**22**

PUBLICATIONS

Peer Reviewed Articles in Journals

Abd.Hamid, Mohd-Kamaruddin; Sin, Gürkan; Gani, Rafiqul. (2010). **Integration of process design and controller design for chemical processes using model-based methodology** Computers & Chemical Engineering, 34(5), 683-699

Abildskov, Jens; Ellegaard, Martin Dela; O'Connell, J.P.. (2010). **Densities and isothermal compressibilities of ionic liquids - Modelling and application** Fluid Phase Equilibria, 295(2), 215-229

Abildskov, Jens; Ellegaard, Martin Dela; O'Connell, J.P. (2010). **Phase Behavior of Mixtures of Ionic Liquids and Organic Solvents** Journal of Supercritical Fluids: (100th year Anniversary of van der Waals' Nobel Lecture), 55(2), 833-845

Agger, Jane; Viksø-Nielsen, Ander; Meyer, Anne S.. (2010). **Enzymatic Xylose Release from Pretreated Corn Bran Arabinoxylan: Differential Effects of Deacetylation and Deferuloylation on Insoluble and Soluble Substrate Fractions** Journal of Agricultural and Food Chemistry, 58(10), 6141-6148

Alvarado, Merlin; Abd.Hamid, Mohd-Kamaruddin; Sin, Gürkan; Gernaey, Krist; Woodley, John; Gani, Rafiqul. (2010). **A Model-Based Methodology for Simultaneous Design and Control of a Bioethanol Production Process** Computers & Chemical Engineering, 34(12), 2043-2061

Andric, Pavle; Meyer, Anne S.; Jensen, Peter Arendt; Dam-Johansen, Kim. (2010). **Effect and Modeling of Glucose Inhibition and In Situ Glucose Removal During Enzymatic Hydrolysis of Pretreated Wheat Straw** Applied Biochemistry and Biotechnology, 160(1), 280-297

Andric, Pavle; Meyer, Anne S.; Jensen, Peter Arendt; Dam-Johansen, Kim. (2010). **Reactor design for minimizing product inhibition during enzymatic lignocellulose hydrolysis II. Quantification of inhibition and suitability of membrane reactors** Biotechnology Advances, 28(3), 407-425

Andric, Pavle; Meyer, Anne S.; Jensen, Peter Arendt; Dam-Johansen, Kim. (2010). **Reactor design for minimizing product inhibition during enzymatic lignocellulose hydrolysis: I. Significance and mechanism of cellobiose and glucose inhibition on cellulolytic enzymes** Biotechnology Advances, 28(3), 308-324

Arnous, Anis; Meyer, Anne S.. (2010). **Discriminated release of phenolic substances from red wine grape skins (Vitis vinifera L.) by multicomponent enzymes treatment** Biochemical Engineering Journal, 49(1), 68-77

Arvelakis, Stelios; Frandsen, Flemming. (2010). **Rheology of fly ashes from coal and biomass co-combustion** Fuel, 89(10), 3132-3140

Awan, Javeed; Tsivintzelis, Ioannis; Breil, Martin; Coquelet, Christophe; Richon, Dominique; Kontogeorgis, Georgios. (2010). **Phase Equilibria of Mixtures Containing Organic Sulfur Species (OSS) and Water/Hydrocarbons: VLE Measurements and Modeling Using the Cubic-Plus-Association Equation of State** Industrial & Engineering Chemistry Research, 49(210), 12718-12725

Awan, Javeed; Thomsen, Kaj; Coquelet, Christophe; Fosbøl, Philip Loldrup; Richon, Dominique. (2010). **Vapor-Liquid Equilibrium Measurements and Modeling of the Propyl Mercaptan plus Methane plus Water System** Journal of Chemical and Engineering Data, 55(2), 842-846

Beier, Matthias Josef; Schimmoeller, Bjoern; Hansen, Thomas Willum; Andersen, Jens Enevold Thaulov; Pratsinis, Sotiris E.; Grunwaldt, Jan-Dierk. (2010). **Selective side-chain oxidation of alkyl aromatic compounds catalyzed by cerium modified silver catalysts** Journal of Molecular Catalysis A: Chemical, 331, 40-49

Beier, Søren; Jonsson, Gunnar Eigil. (2010). **Critical flux determination by flux-stepping** AIChE Journal, 56(7), 1739-1747

Bejenariu, Anca Gabriela; Rasmussen, Henrik K.; Skov, Anne Ladegaard; Hassager, Ole; Frankær, Sarah Maria. (2010). **Large Amplitude Oscillatory Extension of Soft Polymeric Networks** Rheologica Acta, 49(8), 807-814

Benavente, J.; Silva, V.; Pradanos, P.; Palacio, L.; Hernandez, A.; Jonsson, Gunnar Eigil. (2010). **Comparison of the Volume Charge Density of Nanofiltration Membranes Obtained from Retention and Conductivity Experiments** Langmuir, 26(14), 11841-11849

Brix, Jacob; Jensen, Peter Arendt and Jensen, Anker Degn (2010). **Coal devolatilization and char conversion under Suspension fired conditions in O_2/N_2 and O_2/CO_2 atmospheres,** Fuel, 89, pp. 3373-3380

Byrne, Cormac; Eldrup, Morten Mostgaard; Ohnuma, Masato; Eriksen, Rasmus Solmer. (2010). **Free standing bulk metallic glass microcomponents: Tooling considerations** Journal of Materials Processing Technology, 210(11), 1419-1428

Bøjer, Martin; Jensen, Peter Arendt; Dam-Johansen, Kim; Madsen, O.H.; Lundtorp, K.. (2010). **Release of Corrosive Species above the Grate in a Waste Boiler and the Implication for Improved Electrical Efficiency** Energy & Fuels, 24, 5696-5707,

Carvalho, Ana; Matos, Henrique A.; Gani, Rafiqul. (2010). **Design of batch operations: Systematic methodology for generation and analysis of sustainable alternatives** Computers & Chemical Engineering, 33(12), 2075-2090

Ceriani, Roberta; Meirelles, Antonio J.A.; Gani, Rafiqul. (2010). **Simulation of thin-film deodorizers in palm oil refining** Journal of Food Process Engineering, 33(suppl. 1), 208-225

Corominas, L.; Rieger, L.; Takacs, I.; Ekama, G.; Hauduc, H.; Vanrolleghem, P.A.; Oehmen, A.; Gernaey, Krist; van Loosdrecht, M.C.M.; Comeau, Y.. (2010). **New framework for standardized notation in wastewater treatment modelling** Water Science and Technology, 61(4), 841-857

Darde, Victor Camille Alfred; Thomsen, Kaj; Well, Willy J.M. van; Stenby, Erling Halfdan. (2010). **Chilled Ammonia Process for CO_2 Capture** International Journal of Greenhouse Gas Control, 4(2), 131-136

Darde, Victor Camille Alfred; van Well, Willy J. M.; Stenby, Erling Halfdan; Thomsen, Kaj. (2010). **Modeling of carbon dioxide absorption by aqueous ammonia solutions using the Extended UNIQUAC model** Industrial & Engineering Chemistry Research, 49(24), 12663-12674

Daugaard, Anders Egede; Jankova Atanasova, Katja; Bøgelund, J.; Nielsen, J.K.; Hvilsted, Søren. (2010). **Novel UV Initiator for Functionalization of Multiwalled Carbon Nanotubes by Atom Transfer Radical Polymerization Applied on Two Different Grades of Nanotubes** Journal of Polymer Science. Part A, Polymer Chemistry, 48(20), 4594-4601

Díaz Tovar, Carlos Axel; Ceriani, Roberta; Gani, Rafiqul; Sarup, Bent. (2010). **Systematic methodology and property prediction of fatty systems for process design/analysis in the oil and fat industry** Brazilian Journal of Chemical Engineering, 27, 401-412

Dimitrov, Ivaylo; Jankova Atanasova, Katja; Hvilsted, Søren. (2010). **Synthesis of Polystyrene-Based Random Copolymers with Balanced Number of Basic or Acidic Functional Groups** Journal of Polymer Science. Part A, Polymer Chemistry, 48(9), 2044-2052

Dohrn, Ralf; Peper, Stephanie; Fonseca, M.S., José. (2010). **High-Pressure Fluid-Phase Equilibria: Experimental Methods and Systems Investigated (2000-2004)** *Fluid* Phase Equilibria, 288(1-2) (2010) 1-54

Eenschooten, Corinne Diane; Guillaumie, Fanny; Kontogeorgis, Georgios; Stenby, Erling Halfdan; Schwach-Abdellaoui, Khadija. (2010). **Preparation and structural characterisation of novel and versatile amphiphilic octenyl succinic anhydride-modified hyaluronic acid derivatives** Carbohydrate Polymers, 79(3), 597-605

Ellegaard, Martin Dela; Abildskov, Jens; O'Connell, John P.. (2010). **Molecular Thermodynamic Modeling of Mixed Solvent Solubility** Industrial & Engineering Chemistry Research, 49(22), 11620-11632

Elmøe, Tobias Dokkedal; Tricoli, Antonio; Grunwaldt, Jan-Dierk. (2010). **Characterization of highly porous nanoparticle deposits by permeance measurements** Powder Technology, 207, 1-3, 279-289

Faramarzi, Leila; Kontogeorgis, Georgios; Michelsen, Michael Locht; Thomsen, Kaj; Stenby, Erling Halfdan. (2010). **Absorber Model for CO_2 Capture by Monoethanolamine** Industrial & Engineering Chemistry Research, 49(8), 3751-3759

Fettouhi, André; Thomsen, Kaj. (2010). **Solid-liquid equilibria for binary and ternary systems with the Cubic-Plus-Association (CPA) equation of state** Fluid Phase Equilibria, 293(2), 121-129

Fosbøl, Philip Loldrup; Thomsen, Kaj; Stenby, Erling Halfdan. (2010). **Review and recommended thermodynamic properties of $FeCO_3$** Corrosion Engineering, Science and Technology, 45(2), 115-135

Fristrup, Charlotte Juel; Jankova Atanasova, Katja; Hvilsted, Søren. (2010). **Hydrophilization of poly(ether ether ketone) films by surface-initiated atom transfer radical polymerization** Polymer Chemistry, 1(10), 1696-1701

Ganigue, R.; Volcke, E.I.P.; Puig, S.; Balaguer, M.D.; Colprim, J.; Sin, Gürkan. (2010). **Systematic model development for partial nitrification of landfill leachate in a SBR** Water Science and Technology, 61(9), 2199-2210

Gernaey, Krist; Gani, Rafiqul. (2010). **A model based systems approach to pharmaceutical product-process design and analysis** Chemical Engineering Science, 65(21), 5757-5769

Gernaey, Krist; Eliasson Lantz, Anna; Tufvesson, Pär; Woodley, John; Sin, Gürkan. (2010). **Application of mechanistic models to fermentation and biocatalysis for next-generation processes** Trends in Biotechnology, 28(7), 346-354

Glarborg, Peter; Livbjerg, Hans; Wagner, Ayten Yilmaz; Kristensen, Per Gravers. (2010). **Particle Emissions from domestic Gas Cookers** Combustion Science and Technology, 182(10), 1511 - 1527

Glarborg, Peter; Hansen, Stine. (2010). **Simplified Model for Reburning Chemistry** Energy & Fuels, 24(8), 4185-4192

PUBLICATIONS CONTINUED

Gopalakrishnan, Nimi; Sagar, Kaushal Shashikant; Christiansen, Mads Brøkner; Vigild, Martin Etchells; Ndoni, Sokol; Kristensen, Anders. (2010). **UV patterned nanoporous solid-liquid core waveguides** Optics Express, 18(12), 12903-12908

Guo, Fengxiao; Jankova Atanasova, Katja; Schulte, Lars; Vigild, Martin Etchells; Ndoni, Sokol. (2010). **Surface Modification of Nanoporous 1,2-Polybutadiene by Atom Transfer Radical Polymerization or Click Chemistry** Langmuir, 26(3), 2008-2013

Hansen, Stine; Glarborg, Peter. (2010). **A Simplified Model for Volatile-N Oxidation** Energy & Fuels, 24, 2883-2890

Hansen, Thomas Steen; Lind, Johan Ulrik; Daugaard, Anders Egede; Hvilsted, Søren; Andresen, Thomas Lars; Larsen, Niels Bent. (2010). **Complex Surface Concentration Gradients by Stenciled "Electro Click Chemistry"** Langmuir, 26(20), 16171-16177

Hassager, Ole; Hansen, Rasmus. (2010). **Constitutive equations for the Doi-Edwards model without independent alignment** Rheologica Acta, 49(6), 555-562

Hassager, Ole; Marin, Jose Martin Roman; Yu, Kaijia; Rasmussen, Henrik K.. (2010). **Polymeric liquids in extension: fluid mechanics or rheometry?** Rheologica Acta, 49(6)

He, Zeming; Yuan, Hao; Glasscock, Julie; Chatzichristodoulou, Christodoulos; Phair, John; Kaiser, Andreas; Ramousse, Severine **Densification and Grain Growth during Early-stage Sintering of $Ce_{0.9}Gd_{0.1}O_{1.95-\delta}$ in Reducing Atmosphere** Acta Materialia, 58(11) (2010) 3860-3866 (ISSN: 1359-6454), Pergamo

Hendriks, Eric; Kontogeorgis, Georgios; Dohrn, Ralf; de Hemptinne, Jean-Charles; Economou, Ioannis G.; Zilnik, Ljudmila Fele; Vesovic, Velisa. (2010). **Industrial Requirements for Thermodynamics and Transport Properties** Industrial & Engineering Chemistry Research, 49(22), 11131-11141

Huusom, Jakob Kjøbsted; Poulsen, Niels Kjølstad; Jørgensen, Sten Bay. (2010). **Iterative Feedback Tuning of Uncertain State Space Systems** Brazilian Journal of Chemical Engineering, 27(3), 461-472

Ibragimova, Sania; Jensen, Karin Bagger Stibius; Szewczykowski, Piotr Przemyslaw; Perry, Mark; Bohr, Henrik; Helix Nielsen, Claus. (2010). **Hydrogels for in situ encapsulation of biomimetic membrane arrays** Polymers for Advanced Technologies, 21, 1-8

Jain, Priyanka; Stenby, Erling Halfdan; von Solms, Nicolas. (2010). **Compositional Simulation of In-Situ Combustion EOR: A Study of Process Characteristics** S P E Journal, 129869

Javakhishvili, Irakli; Binder, W.H.; Tanner, S.; Hvilsted, Søren. (2010). **Facile synthesis of linear-dendritic cholesteryl-poly(epsilon-caprolactone)-b-(L-lysine)(G2) by thiol-ene and azide-alkyne "click" reactions** Polymer Chemistry, 1(4), 506-513

Javakhishvili, Irakli; Hvilsted, Søren. (2010). **Miktoarm core-crosslinked star copolymers with biologically active moieties on peripheries** Polymer Chemistry, 1(10), 1650-1661

Jensen, Lars; Thomsen, Kaj; von Solms, Nicolas; Wierzchowski, S.; Walsh, M.R.; Koh, C.A.; Sloan, E.D.; Wu, D.T.; Sum, A.K.. (2010). **Calculation of Liquid Water-Hydrate-Methane Vapor Phase Equilibria from Molecular Simulations** Journal of Physical Chemistry Part B: Condensed Matter, Materials, Surfaces, Interfaces & Biophysical, 114(17), 5775-5782

Jensen, Lars; Ramløv, Hans; Thomsen, Kaj; von Solms, Nicolas. (2010). **Inhibition of Methane Hydrate Formation by Ice-Structuring Proteins** Industrial & Engineering Chemistry Research, 49(4), 1486-1492

Jensen, Mette Krog; Hassager, Ole; Rasmussen, Henrik K.; Skov, Anne Ladegaard; Bach, Anders; Koldbech, Henning Vitus. (2010). **Planar elongation of soft polymeric networks** Rheologica Acta, 49(1), 1-13

Jiménez-Gonzaléz, Concepcion; Woodley, John. (2010). **Bioprocesses: Modelling needs for process evaluation and sustainability assessment** Computers & Chemical Engineering, 34(7), 1009-1017

Kiil, Søren. (2010). **Quantification of simultaneous solvent evaporation and chemical curing in thermoset coatings** Journal of Coatings Technology and Research, 7(5), 569-586

Kimmerle, B.; Baiker, A.; Grunwaldt, Jan-Dierk. (2010). **Oscillatory behaviour of catalytic properties, structure and temperature during the catalytic partial oxidation of methane on Pd/Al2O3** Physical Chemistry Chemical Physics, 12(10), 2288-2291

Kontogeorgis, Georgios; Economou, Ioannis G.. (2010). **Equations of State: From the Ideas of van der Waals to Association Theories** Journal of Supercritical Fluids: Special van der Waals issue, 55(2), 421-437

Kontogeorgis, Georgios; Tsivintzelis, Ioannis; von Solms, Nicolas; Grenner, Andreas; Bøgh, David; Frost, Michael; Knage-Rasmussen, Anders; Economou, Ioannis G.. (2010). **Use of Monomer Fraction Data in the Parametrization of Association Theories** Fluid Phase Equilibria, 296(2), 219-229

Laursen, A. B.; Højholt, Karen Thrane; Lundegaard, L.F.; Simonsen, S.B.; Helveg, S.; Schuth, F.; Paul, M.; Grunwaldt, J.D.; Kegnæs, Søren; Christensen, Claus H.; Egeblad, Kresten. (2010). **Substrate Size-Selective Catalysis with Zeolite-Encapsulated Gold Nanoparticles** Angewandte Chemie (International Edition), 49(20), 3504-3507

Lerche, Benedicte Mai. (2010). **Fang CO_2 med Aminosyrer** Aktuel Naturvidenskab, 6, 24-27

Lewis, Alison E.; Nathoo, J.; Thomsen, Kaj; Kramer, H.J.; Witkamp, G.J.; Reddy, S.T.; Randall, Dyllon G.. (2010). **Design of a Eutectic Freeze Crystallization process for multicomponent waste water stream** Chemical Engineering Research & Design, 88(9), 1290-1296

Li, Li; Wang, Yanwei; Vigild, Martin Etchells; Ndoni, Sokol. (2010). **Physisorption of SDS in a Hydrocarbon Nanoporous Polymer** Langmuir, 26(16), 13457-13465

Liin, Netta; Lind, Morten; Jensen, Niels; Jørgensen, Sten Bay. (2010). **A Functional HAZOP Methodology** Computers & Chemical Engineering, 34(2), 244-253

Lin, Yi; ten Kate, Antoon; Mooijer, Miranda; Delgado, Javier; Fosbøl, Philip Loldrup; Thomsen, Kaj. (2010). **Comparison of activity coefficient models for electrolyte systems** A I Ch E Journal, 56(5), 1334-1351

Lutze, Philip; Dada, Emmanuel; Gani, Rafiqul; Woodley, John. (2010). **Heterogeneous Catalytic Distillation - A Patent Review** Recent Patents on Chemical Engineering, 3, 208-229

Lutze, Philip; Gani, Rafiqul; Woodley, John. (2010). **Process Intensification: A Perspective on Process Synthesis** Chemical Engineering and Processing, 49(6), 547-558,

Mapari, Sameer Shamsuddin; Thrane, Ulf; Meyer, Anne S.. (2010). **Fungal polyketide azaphilone pigments as future natural food colorants?** Trends in Biotechnology, 28(6), 300-307

Meyer, Anne S.; Arnous, Anis. (2010). **Enzymatic modifications of grape skin phenolics A new look at wine maceration?** Agro Food Industry Hi-Tech, 21(1), 26-29

Meyer, Anne S.; Zeuner, Birgitte; Pinelo-Jiménez, Manuel. (2010). **Juice clarification by protease and pectinase treatments indicates new roles of pectin and protein in cherry juice turbidity** Food and Bioproducts Processing, 88(2-3), 259-265

Mondelli, C.; Grunwaldt, Jan-Dierk; Ferri, D.; Baiker, A.. (2010). **Role of Bi promotion and solvent in platinum-catalyzed alcohol oxidation probed by in situ X-ray absorption and ATR-IR spectroscopy** Physical Chemistry Chemical Physics, 12(20), 5307-5316

Nielsen, Sidsel Marie; Shapiro, Alexander; Michelsen, Michael Locht; Stenby, Erling Halfdan. (2010). **1D Simulations for Microbial Enhanced Oil Recovery with Metabolite Partitioning** Transport in Porous Media, 85(3), 785-802

Nielsen, S.M.; Jessen, K.; Shapiro, A.A.; Michelsen, M.L.; Stenby, E.H. (2010) **Microbial Enhanced Oil Recovery: 3D Simulation with Gravity Effects** SPE 131048

Niu, Ben; Yan, Wei; Shapiro, Alexander; Stenby, Erling Halfdan. (2010). **In-Situ Phase Identification and Saturation Determination in Carbon Dioxide Flooding of Water Flooded Chalk Using X-Ray Computed Tomography** S P E Journal, 129760

Nopens, I.; Benedetti, L.; Jeppsson, U.; Pons, M.-N.; Alex, J.; Copp, J.B.; Gernaey, Krist; Rosen, C.; Steyer, J.-P.; Vanrolleghem, P.A.. (2010). **Benchmark Simulation Model No 2 - finalisation of plant layout and default control strategy** Water Science and Technology, 62(9), 1967-1974

Olivares Hernandez, Roberto; Sunner, Hampus; Frisvad, Jens Christian; Olsson, Lisbeth; Nielsen, Jens; Panagiotou, Gianni. (2010). **Combining substrate specificity analysis with support vector classifiers reveals feruloyl esterase as a phylogenetically informative protein group** P L o S One, 5(9)

Olsen, S.M.; Kristensen, J.B.; Laursen, B.S.; Pedersen, L.T.; Dam-Johansen, Kim; Kiil, Søren. (2010). **Antifouling effect of hydrogen peroxide release from enzymatic marine coatings: Exposure testing under equatorial and Mediterranean conditions** Progress in Organic Coatings, 68(3), 248-257

Olsen, Stefan Møller; Pedersen, L.T.; Dam-Johansen, Kim; Kiil, Søren. (2010). **A passive apparatus for controlled-flux delivery of biocides: hydrogen peroxide as an example** Biofouling, 26(2), 213-222

Olsen, Søren Martin; Pedersen, L. T.; Dam-Johansen, Kim; Kristensen, J.B.; Kiil, Søren. (2010). **Replacement of traditional seawater-soluble pigments by starch and hydrolytic enzymes in polishing antifouling coatings** Journal of Coatings Technology and Research, 7(3), 355-363

Pauw, Brian Richard; Vigild, Martin Etchells; Mortensen, Kell; Andreasen, Jens Wenzel; Klop, Enno A.. (2010). **Analysing the nanoporous structure of aramid fibres** Journal of Applied Crystallography, 43, 837-849

PUBLICATIONS CONTINUED

Pauw, Brian Richard; Vigild, Martin Etchells; Mortensen, Kell; Andreasen, Jens Wenzel; Klop, Enno A.; Breiby, Dag Werner; Bunk, Oliver. (2010). **Strain-induced internal fibrillation in looped aramid filaments** Polymer, 51(20), 4589-4598,

Pedersen, Anne Juul; van Lith, Simone Cornelia; Frandsen, F. J.; Steinsen, S. D.; Holgersen, Lilian Beenfeldt. (2010). **Release to the gas phase of metals, S and Cl during combustion of dedicated waste fractions** Fuel Processing Technology, 91(9), 1062-1072

Pedersen, Kim Hougaard; Jensen, Anker Degn; Dam-Johansen, Kim (2010). **The effect of low-NO_x combustion on residual carbon in fly ash and its adsorption capacity for air entrainment admixtures in concrete** Combust. Flame, 157, 208-216

Pedersen, Mads; Meyer, Anne S.. (2010). **Lignocellulose pretreatment severity – relating pH to biomatrix opening** New Biotechnology, 27(6), 739-750

Pedersen, Mads; Viksø-Nielsen, Anders; Meyer, Anne S.. (2010). **Monosaccharide yields and lignin removal from wheat straw in response to catalyst type and pH during mild thermal pretreatment** Process Biochemistry, 45(7), 1181-1186

Petersen, Nanna; Ödman, Peter; Cervera Padrell, Albert Emili; Stocks, S.; Eliasson Lantz, Anna; Gernaey, Krist. (2010). **In Situ Near Infrared Spectroscopy for Analyte-Specific Monitoring of Glucose and Ammonium in *Streptomyces coelicolor* Fermentations** Biotechnology Progress, 26(1), 263-271

Prado Rubio, Oscar Andres; Møllerhøj, Martin; Jørgensen, Sten Bay; Jonsson, Gunnar Eigil. (2010). **Modeling Donnan Dialysis Separation for Carboxylic Anion Recovery** Computers & Chemical Engineering, 34(10), 1567-1579

Privat, Romain; Gani, Rafiqul; Jaubert, Jean-Noël. (2010). **Are safe results obtained when the PC-SAFT equation of state is applied to ordinary pure chemicals?** Fluid Phase Equilibria, 295(1), 76-95

Ramzan, Naveed; Faheem, Muhammad; Gani, Rafiqul; Witt, Werner. (2010). **Multiple steady states detection in a packed-bed reactive distillation column using bifurcation analysis** Computers & Chemical Engineering, 34(4), 460-466

Rasmussen, Henrik K.; Bejenariu, Anca Gabriela; Hassager, Ole; Auhl, D.. (2010). **Experimental evaluation of the pure configurational stress assumption in the flow dynamics of entangled polymer melts** Journal of Rheology, 54(6), 1325-1336

Rasmussen, Louise Enggaard; Sørensen, Jens F.; Meyer, Anne S.. (2010). **Kinetics and substrate selectivity of a Triticum aestivum xylanase inhibitor (TAXI) resistant D11F/R122D variant of Bacillus subtilis XynA xylanase** Journal of Biotechnology, 146(4), 207-214

Rasmussen, Louise Enggaard; Meyer, Anne S.. (2010). **Size exclusion chromatography for the quantitative profiling of the enzyme-catalyzed hydrolysis of xylo-oligosaccharides** Journal of Agricultural and Food Chemistry, 58(2), 762-769

Reimann, S.; Grunwaldt, Jan-Dierk; Mallat, T.; Baiker, A. (2010). **Asymmetric C-C Bond-Formation Reaction with Pd: How to Favor Heterogeneous or Homogeneous Catalysis?** Chemistry: A European Journal, 16(31), 9658-9668

Román Marín, José Manuel; Rasmussen, Henrik K.; Hassager, Ole. (2010). **3D Simulation of Nano-Imprint Lithography** Nanoscale Research Letters, 5(2), 274-278

Rossing, Netta Liin; Lind, Morten; Jensen, Niels; Jørgensen, Sten Bay (2010). **A Goal based methodology for HAZOP analysis**. Nuclear safety and simulation.

Ruano, M.V.; Ribes, J.; Sin, Gürkan; Seco, A.; Ferrer, J.. (2010). **A systematic approach for fine-tuning of fuzzy controllers applied to WWTPs** Environmental Modelling & Software, 25(5), 670-676

Satyanarayana, Kavitha Chelakara; Abildskov, Jens; Gani, Rafiqul; Tsolou, Georgia; Mavrantzas, Vlasis G.. (2010). **Computer aided polymer design using multiscale modeling** Brazilian Journal of Chemical Engineering, 27, 369-380

Schapper, D.; Stocks, S.M.; Szita, Nicolas; Eliasson Lantz, Anna; Gernaey, Krist. (2010). **Development of a single-use microbioreactor for cultivation of microorganisms** Chemical Engineering Journal, 160(3), 891-898

Seoane, Jose Miguel; Sin, Gürkan; Lardon, Laurent; Gernaey, Krist; Smets, Barth F. (2010). **A New Extant Respirometric Assay to Estimate Intrinsic Growth Parameters Applied to Study Plasmid Metabolic Burden** Biotechnology and Bioengineering, 105(1), 141-149

Shapiro, Alexander; Bedrikovetsky, P. G. (2010). **A Stochastic Theory for Deep Bed Filtration Accounting for Dispersion and Size Distributions** Physica A: Statistical Mechanics and its Applications, 389(13), 2473-2494

Sin, Gürkan; Meyer, Anne S.; Gernaey, Krist. (2010). **Assessing Reliability of Cellulose Hydrolysis Models to Support Biofuel Process Design – Identifiability and Uncertainty Analysis** Computers & Chemical Engineering, 34(9), 1385-1392

Singh, Ravendra; Gernaey, Krist; Gani, Rafiqul. (2010). **An ontological knowledge based system for selection of process monitoring and analysis tools** Computers & Chemical Engineering, 34(7), 1137-1154

Singh, Ravendra; Gernaey, Krist; Gani, Rafiqul. (2010). **ICAS-PAT: A Software for Design, Analysis and Validation of PAT Systems** Computers & Chemical Engineering, 34(7), 1108-1136

Smith, M.E.B; Chen, B.H.; Hibbert, E.G; Kaulmann, U.; Smithies, K.; Galman, J.; Baganz, F.; Dalby, P.A.; Hailes, H.C.; Lye, G.J.; Ward, J.M.; Woodley, John; Micheletti, M.. (2010). **A Multidisciplinary Approach Toward the Rapid and Preparative-Scale Biocatalytic Synthesis of Chiral Amino Alcohols: A Concise Transketolase-/omega-Transaminase-Mediated Synthesis of (2S,3S)-2-Aminopentane-1,3-diol** Organic Process Research and Development, 14(1), 99-107

Sørensen, P.A.; Dam-Johansen, Kim; Weinell, C.E.; Kiil, Søren. (2010). **Cathodic delamination: Quantification of ionic transport rates along coating-steel interfaces** Progress in Organic Coatings, 68(1-2), 70-78

Sørensen, Per Aggerholm; Dam-Johansen, Kim; Weinell, C. E.; Kiil, Søren. (2010). **Cathodic delamination of seawater-immersed anticorrosive coatings: Mapping of parameters affecting the rate** Progress in Organic Coatings, 68(4), 283-292

Sørensen, Per Aggerholm; Weinell, C. E.; Dam-Johansen, Kim; Kiil, Søren. (2010). **Reduction of cathodic delamination rates of anticorrosive coatings using free radical scavengers** Journal of Coatings Technology and Research, 7(6), 773-786

Thomassen, Lise Vestergaard; Meyer, Anne S.. (2010). **Statistically designed optimisation of enzyme catalysed starch removal from potato pulp** Enzyme and Microbial Technology, 100(3-4), 297-303

Toftegaard, Maja Bøg; Brix, Jacob; Jensen, Peter Arendt; Glarborg, Peter; Jensen, A.D.. (2010). **Oxy-fuel combustion of solid fuels** Progress in Energy and Combustion Science, 36(5), 581-625

Toftegaard, Maja Bøg; Brix, Jacob; Jensen, Peter Arendt; Glarborg, Peter; Jensen, Anker Degn (2010). **Progress in Energy and Combustion Science** Progress in Energy and Combustion Science, 36, pp. 581-625

Tsivintzelis, Ioannis; Kontogeorgis, Georgios; Michelsen, Michael Locht; Stenby, Erling Halfdan. (2010). **Modelling Phase Equilibria for Acid Gas Mixtures using the CPA Equation of State I. Mixtures with H_2S** AIChE Journal, 56(11), 2965-2982

Tufvesson, Pär; Fu, Wenjing; Jensen, Jacob Skibsted; Woodley, John. (2010). **Process considerations for the scale-up and implementation of biocatalysis** Food and Bioproducts Processing, 88(C1), 3-11

Tybjerg, Peter Chr. V.; Kontogeorgis, Georgios; Michelsen, Michael Locht; Stenby, Erling Halfdan. (2010). **Phase equilibria modeling of methanol-containing systems with the CPA and sPC-SAFT equations of state** Fluid Phase Equilibria, 288(1-2), 128-138

van Ruymbeke, E.; Nielsen, J.; Hassager, Ole. (2010). **Linear and nonlinear viscoelastic properties of bidisperse linear polymers: Mixing law and tube pressure effect** Journal of Rheology, 54(5), 1155-1172

van Speybroeck, Veronique; Gani, Rafiqul; Meier, Robert Johan. (2010). **The calculation of thermodynamic properties of molecules** Chemical Society Reviews, 39(5), 1764 - 1779

Venkatasubramanian, V.; Gani, Rafiqul. (2010). **Editorial** Computers & Chemical Engineering, 34(10), 1565-1566

Vennestrøm, Peter Nicolai Ravnborg; Taarning, Esben; Christensen, Claus H.; Pedersen, S.; Grunwaldt, Jan-Dierk; Woodley, John. (2010). **Chemoenzymatic combination of glucose oxidase with titanium silicalite -1** ChemCatChem, 2(8), 943-945

von Solms, Nicolas; Kristensen, Jakob. (2010). **Refrigeration plants using carbon dioxide as refrigerant: measuring and modelling the solubility and diffusion of carbon dioxide in polymers used as sealing materials** International Journal of Refrigeration, 33(1), 19-25

Wang, Yanwei; Teraoka, Iwao; Hansen, Flemming Yssing; Peters, Günther H.J.; Hassager, Ole. (2010). **A Theoretical Study of the Separation Principle in Size Exclusion Chromatography** Macromolecules, 43(3), 1651-1659

Wedberg, Rasmus; Peters, Günther H. J.; O'Connell, John P.; Abildskov, Jens. (2010). **Accurate Kirkwood-Buff integrals from molecular simulations** Molecular Simulation, 36(15), 1243-1252

Wong, M.; Woodley, John; Lye, G.J.. (2010). **Application of bipolar electrodialysis to E.coli fermentation for simultaneous acetate removal and pH control** Biotechnology Letters, 32(8), 1053-1057

PUBLICATIONS CONTINUED

Yu, Kaijia; Román Marín, José Manuel; Rasmussen, Henrik K.; Hassager, Ole. (2010). **3D modeling of dual wind-up extensional rheometers** Journal of Non-Newtonian Fluid Mechanics, 165(1-2), 14-23

Yuan, Hao; Shapiro, Alexander. (2010). **Modeling Non-Fickian Transport and Hyperexponential Deposition for Deep Bed Filtration** Chemical Engineering Journal, 162, 974-988

Yuan, Hao; Shapiro, Alexander (2010) **A Mathematical Model for Non-monotonic Deposition Profiles in Deep Bed Filtration Systems** E-published in journal: Chemical Engineering Journal (ISSN: 1385-8947), 2010, Elsevier

Zahid, Adeel; Stenby, Erling Halfdan; Shapiro, Alexander. (2010). **Improved Oil Recovery in Chalk: Wettebility Alteration or Something Else?** S P E Journal, 131300

Zainal Alam, Muhd Nazrul Hisham; Schäpper, Daniel; Gernaey, Krist. (2010). **Embedded resistance wire as a heating element for temperature control in microbioreactors** Journal of Micromechanics and Microengineering, 20(5), 055014

Zhang, Xuan; Shapiro, Alexander; Stenby, Erling Halfdan. (2010). **Upscaling of Two-Phase Immiscible Flows in Communicating Stratified Reservoirs** Transport in Porous Media, 87 (2011), 739-764

Zhou, Y.; Grunwaldt, Jan-Dierk; Krumeich, F.; Zheng, K.B.; Chen, G.R.; Stotzel, J.; Frahm, R.; Patzke, G.R.. (2010). **Hydrothermal Synthesis of $Bi_6S_2O_{15}$ Nanowires: Structural, in situ EXAFS, and Humidity-Sensing Studies** Small, 6(11), 1173-1179

Ödman, Peter; Johansen, C.L.; Olsson, L.; Gernaey, Krist; Eliasson Lantz, Anna. (2010). **Sensor combination and chemometric variable selection for online monitoring of Streptomyces coelicolor fed-batch cultivations** Applied Microbiology and Biotechnology, 86(6), 1745-1759

Unreviewed Articles

Christensen, Jakob Munkholt; Jensen, Peter Arendt; Schiødt, Niels Christian Jensen, Anker Degn (2010). **Coupling of Alcohols over Alkali-Promoted Cobalt-Molybdenum Sulfide** ChemCatChem, 2, pp. 523-526

Jensen, Pernille Erland; Kirkelund, Gunvor Marie; Ottosen, Lisbeth M.; Christensen, Iben Vernegren; Pedersen, Anne Juul. (2010). **Opgradering af farligt røggasaffald** Dansk Kemi, 91(4), 16-19

Lerche, Benedicte Mai. (2010). **Fang CO_2 med Aminosyrer** Aktuel Naturvidenskab, 6, 24-27

Szabo, Peter. (2010). **IYC 2011 - det internationale "Kemiens år"**. Dansk Kemi, 91(10), 4

Tufvesson, Pär; Christiansen, L.S.; Jensen, Jacob Skibsted; Woodley, John. (2010). **Biokatalytisk procesteknologi i produktionen af lægemidler** Dansk Kemi, 91(1/2), 21-22

Conference Papers Published in Book/ Proceeding

Abd.Hamid, Mohd-Kamaruddin; Sin, Gürkan; Gani, Rafiqul. **Application of Decomposition Methodology to Solve Integrated Process Design and Controller Design Problems for Reactor-Separator-Recycle System**. Presented at: International Symposium on Dynamics and Control of Process Systems. Leuven, Belgium, 2010 Proceedings of 9th International Symposium on Dynamics and Control of Process Systems, 449-454, TuMT3.3

Abd.Hamid, Mohd-Kamaruddin; Sin, Gürkan; Gani, Rafiqul. **Application of Decomposition Methodology to Solve Integrated Process Design and Controller Design Problem for Reactor-Separator-Recycle System**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 148-149

Abdul Samad, Noor Asma Fazli; Singh, Ravendra; Sin, Gürkan; Gernaey, Krist; Gani, Rafiqul. **Control of Process Operations and Monitoring of Product Qualities through Generic Model-based in Batch Cooling Crystallization**. Presented at: European Symposium on Computer Aided Process Engineering, 2010 Computer-Aided Chemical Engineering Series; Volume 28, 613-618

Albæk, Mads Orla; Gernaey, Krist; Hansen, M.S; Stocks, Stuart M. **Comparison of traditional Rushton disc turbines with up-pumping hydrofoil B2 Impellers in 550L pilot scale aerobic submerged fermentations.** Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 83

Alvarado, Merlin; Gernaey, Krist; Woodley, John; Gani, Rafiqul. **Synthesis, Design and Analysis of Downstream Separation in Bio-refinery Processes through a Group-Contribution Approach**. Presented at: European Symposium

on Computer Aided Process Engineering - ESCAPE20, 2010 Computer-Aided Chemical Engineering Series; Volume 28, 1147-1152
Andrade Santacoloma, Paloma de Gracia; Sin, Gürkan; Gernaey, Krist; Woodley, John. **Sensitivity Analysis of a Kinetic Model Describing the Bi-enzymatic Synthesis of Lactobionic Acid**. Presented at: European Symposium on Computer Aided Process Engineering, 2010 Computer-Aided Chemical Engineering Series; 28, 1491-1496

Andrade Santacoloma, Paloma de Gracia; Sin, Gürkan; Gernaey, Krist; Woodley, John. **New concepts for multi-enzymatic synthetic processes**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 182-183

Awan, Javeed A.; Tsivintzelis, Ioannis; Coquelet Christophe; Kontogeorgis, Georgios M. (2010) **Thermodynamic of the Mixtures containing Organic Sulfur Species (OSS) in water and Hydrocarbons; Experimental VLE measurements and Modeling Using the Cubic-Plus-Association Equation of State**. Presented at: 21st IUPAC International Conference on Chemical Thermodynamics, Tusukuba, Japan

Bejenariu, Anca Gabriela; Rasmussen, Henrik K.; Auhl, Dietmar; Skov, Anne Ladegaard; Hassager, Ole. **Reversed extensional flow on polyisoprene melts**. Presented at: Nordic Rheology Conference. Sweden, 2010 Nordic Rheology Conference

Bialas, Dawid Jan; Huusom, Jakob Kjøbsted; Jørgensen, John Bagterp; Sin, Gürkan. **Model predictive control for reactor-separator-recycle system**. Presented at: Dansk Kemiingeniørkonference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 145

Carvalho, Ana; Gani, Rafiqul; Matos, Henrique A.. **Design of Sustainable Processes: Systematic Generation & Evaluation of Alternatives**. Presented at: 2nd Annual Gas Processing Symposium. Doha, Qatar, 11-14 January, 2010 Proceedings of the 2nd Annual Gas Processing Symposium, 267-272

Cervera Padrell, Albert Emili; Gernaey, Krist; Gani, Rafiqul; Kiil, Søren; Skovby, Tommy. **Moving from batch toward continuous organic-chemical pharmaceutical production**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 133-134

Christensen, Hans Peter; Vigild, Martin Etchells; Thomsen, Erik Vilain; Szabo, Peter; Horsewell, Andy. **Active teaching methods, studying responses and learning**. Presented at: International workshop on Active Learning in Engineering Education. Barcelona, 2009 Proceedings of the International workshop on Active Learning in Engineering Education, Barcelona 2009

Comas J., Rodríguez-Roda I., Hug T., Copp J., Flores-Alsina X., Gernaey K.V., Hermanowizc S.W., Jeppsson U., Pagilla K., Poch M., Rosen C. and Steyer J.P. (2010) **Modelling of microbial-related operational problems in WWT**. Proceedings 2nd IWA/WEF Wastewater Treatment Modelling Seminar (WWTmod2010), Mont-Sainte-Anne, Quebec, Canada, March 28-30, pp 369-378

Conte, Elisa; Gani, Rafiqul. **Formulation design: managing the complexity through the Virtual Laboratory**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 146-147

Conte, Elisa; Gani, Rafiqul; Malik, Tom. **The Virtual Product-Process Design Laboratory applied to personal care formulations**. Presented at: 20th European Symposium on Computer Aided Process Engineering, 2010 Computer-Aided Chemical Engineering Series; Volume 28, 1297-1302

Corominas Ll., Rieger L., Takács I., Ekama G., Hauduc H., Vanrolleghem P.A., Oehmen A., Gernaey K.V., van Loosdrecht M.C.M. and Comeau Y. (2010) **New framework for standardized notation in wastewater treatment modelling**. Proceedings 2nd IWA/WEF Wastewater Treatment Modelling Seminar (WWTmod2010), Mont-Sainte-Anne, Quebec, Canada, March 28-30, pp 33-51.

Díaz Tovar, Carlos Axel; Gani, Rafiqul; Sarup, Bent. **Lipid Technology: Merging Property Prediction & process Design/Analysis in the Edible Oil Industry**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 140-141

Ellegaard, Martin Dela; Abildskov, Jens; O'Connell, John P.. **Modelling af opløseligheder i systemer med blandede solventer**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 167-168

Feyissa, Aberham Hailu; Adler-Nissen, Jens; Gernaey, Krist. **Approaches to Robust Modelling of Frying Processes**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 114-115

Fosbøl, Philip Loldrup; Thomsen, Kaj; Stenby, Erling Halfdan. **How to Model CO_2 Capture**. Presented at: Dansk Kemiingeniørkonference. Kgs. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010: DK2, 95-96

PUBLICATIONS CONTINUED

Fu, Wenjing; Boisen, Astrid; Pedersen, Sven; Gani, Rafiqul; Woodley, John; Jensen, Jacob Skibsted; Riisager, Anders. **Process Design for Chemo-enzymatic Synthesis of 5-Hydroxymethylfurfural**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 205

Gernaey K.V., Benedetti L., Corominas Ll., Langergraber G., Jeppsson U., Flores-Alsina X., Rosen C. and Vanrolleghem P.A. (2010) **Wastewater treatment plant influent disturbance models**. Proceedings 2nd IWA/WEF Wastewater Treatment Modelling Seminar (WWTmod2010), Mont-Sainte-Anne, Quebec, Canada, March 28-30, pp 283-287.

Gernaey, Krist; Schäpper, Daniel; Zainal Alam, Muhd Nazrul Hisham; Bolic, Andrijana. **Microreactors for Application in biotech Process Development**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 132

Gopalakrishnan, Nimi; Christiansen, Mads Brøkner; Ndoni, Sokol; Kristensen, Anders; Sagar, Kaushal Shashikant; Vigild, Martin Etchells. **Nanoporous polymer liquid core waveguides**. Presented at: 2010 Conference on Lasers and Electro-Optics (CLEO) and Quantum Electronics and Laser Science Conference (QELS), 2010 2010 Conference on Lasers and Electro-Optics (CLEO) and Quantum Electronics and Laser Science Conference (QELS), 1-2

Hassager, Ole. **Polymeric Liquids in Extension: Fluid Mechanics or Rheometry**. Presented at: Weissenberg Award Lecture, Cardiff, Wales, 2009 Weissenberg Award Lecture - 5th Annual European Rheology Conference

Heitzig, Martina; Sin, Gürkan; Glarborg, Peter; Gani, Rafiqul. **A computer-aided framework for regression and multi-scale-modelling needs in innovative product-process engineering**. Presented at: European Symposium on Computer Aided Process Engineering, 2010 Computer-Aided Chemical Engineering Series; Volume 28, 379-384

Heitzig, Martina; Sin, Gürkan; Glarborg, Peter; Gani, Rafiqul. **Computer-Aided Modelling for Efficient and Innovative Product-Process Engineering**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 16-17 June, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 171-172

Huusom, Jakob Kjøbsted; Poulsen, Niels Kjølstad; Jørgensen, Sten Bay; Jørgensen, John Bagterp. **ARX-Model based Model Predictive Control with Offset-Free Tracking**. Presented at: European Symposium on Computer Aided Process Engineering, 2010 Computer-Aided Chemical Engineering Series; Volume 28, 601-606

Huusom, Jakob Kjøbsted; Poulsen, Niels Kjølstad; Jørgensen, Sten Bay; Jørgensen, John Bagterp. **Tuning of ARX-based Model Predictive Control for Offset-free Tracking**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 152-153

Huusom, Jakob Kjøbsted; Poulsen, Niels Kjølstad; Jørgensen, Sten Bay; Jørgensen, John Bagterp. **Tuning of methods for offset free MPC based on ARX model representations**. Presented at: American Control Conference. Baltimore, Maryland, USA,, 2010 Proceedings of the American Control Conference, 2255-2360

Huusom, Jakob Kjøbsted; Poulsen, Niels Kjølstad; Jørgensen, Sten Bay; Jørgensen, John Bagterp. **Tuning of Offset-Free ARX-based SISO Model Predictive Control**. Presented at: IEEE Conference on Decision and Control. Atlanta, Georgia, USA, 15-17 December, 2010 CDC49

Jensen, L. 2010: **Inhibition of Gas Hydrate Formation by Low-dosage Environmentally Benign Inhibitors** (Oral presentation), Gas Processing Center's 2nd Annual Symposium, Doha, Qatar, January 11-14 2010, Proceedings of the 2nd Annual Gas Processing Symposium; ISBN 978-0-444-53588-7.

Kontogeorgis, G.M, Tsivintzelis, I., Michelsen, M.L., Breil, M.P., Stenby, E.H. 2010: **The Cubic Plus Association (CPA) Equation of State: What have we learnt in 15 years and future challenges** (Invited lecture), Special Symposium: 20 years of the SAFT equation: Recent advantages and challenges, SAFT2010, Barcelona, Spain, September 19-21, 2010.

Kontogeorgis, G. M., Tsivintzelis, I., Folas, G.K., Michelsen, M.L. Michelsen and Stenby, EH. 2010: **Towards Predictive Association Theories** (Oral presentation), The 12th International Conference on Properties and Phase Equilibria for Product and Process Design, May, 2010, Suzhou, China, Article published in conference proceedings, Digital Edition.

Kranker, Tine; Svendsen, Lene; Lencastre Fernandes, Rita; Gernaey, Krist. **A Population Balance Model for Microbial Populations in Fermentors**. Presented at: Dansk Kemiingeniørkonference, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 202

Lencastre Fernandes, Rita; Schäpper, Daniel; Okkels, Fridolin; Eliasson Lantz, Anna; Bruus, Henrik; Gernaey, Krist. **Structurally optimized microbioreactors for immobilized yeast cultivations**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 194-195

Lutze, Philip; Román-Martinez, Alicia; Woodley, John; Gani, Rafiqul. **A systematic synthesis and design methodology to achieve process intensification in (bio) chemical processes**. Presented at: European Symposium on Computer Aided Process Engineering, 2010 Computer-Aided Chemical Engineering Series; Volume 28, 241-246

Lutze, Philip; Gani, Rafiqul; Woodley, John. **Development of a Systematic Synthesis/ Design Methodology incorporating Process Intensification**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 186-187

Morales Rodriguez, Ricardo; Capron, Marie; Huusom, Jakob Kjøbsted; Sin, Gürkan. **Controlled fed-batch operation for enzymatic cellulose hydrolysis in 2G bioethanol production**. Presented at: European Symposium on Computer Aided Process Engineering, 2010 20th European Symposium of Computer Aided Process Engineering Volume 28; Volume 28, 1497-1502

Morales Rodriguez, Ricardo; Gernaey, Krist; Meyer, Anne S.; Sin, Gürkan. **Integrated Dynamic Plant-Wide Model-Based Simulation of Bioethanol Production from Lignocellulose**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 192-193

Morales-Rodriguez R, Meyer AS, Gernaey KV and Sin G (2010) **Development of a mathematical model describing hydrolysis and co-fermentation of C_6 and C_5 sugars**. Proceedings 2nd International Symposium on Sustainable Chemical Product and Process Engineering. Hangzhou, China, May 9-12, 2010.

Nielsen, Sidsel Marie; Jessen, K.; Shapiro, Alexander; Michelsen, Michael Locht; Stenby, Erling Halfdan. **Microbial Enhanced Oil Recovery: 3D Simulation with Gravity Effects**. Presented at: SPE EUROPEC/EAGE Annual Conference and Exhibition. Barcelona, Spain, 2010 SPE EUROPEC/EAGE, 131048, doi:10.2118/131048-MS

Niu, Ben; Yan, Wei; Shapiro, Alexander; Stenby, Erling Halfdan. **In-Situ Phase Identification and Saturation Determination in Carbon Dioxide Flooding of Water Flooding Chalk Using X-Ray Computed Tomography**. Presented at: SPE Improved Oil Recovery Symposium. Oklahoma, USA, 2010 Proceedings from 17th SPE Improved Oil Recovery Symposium, 13, doi:10.2118/129760-MS

Nordblad, Mathias; Xu, Yuan; Pedersen, Lars Saaby; Woodley, John. **Impact of reaction engineering parameters on process design for enzyme-based FAEE-biodiesel production**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 16-17 June, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 173

Olsen, Dres Foged; Jørgensen, John Bagterp; Villadsen, John; Jørgensen, Sten Bay. **Modeling and Simulation of Single Cell Protein Production**. Presented at: 11th Computer Applications in Biotechnology. Leuven, Belgium, 2010 11th Computer Applications in Biotechnology, 502-507

Olsen, Dres Foged; Jørgensen, John Bagterp; Villadsen, John; Jørgensen, Sten Bay. **Optimal Operating Points for SCP Production in the U-Loop Reactor**. Presented at: 9th International Symposium on Dynamics and Control of Process Systems, 2010 9th International Symposium on Dynamics and Control of Process Systems

Olsen, Dres Foged; Jørgensen, John Bagterp; Villadsen, John; Jørgensen, Sten Bay. **Single-Cell Protein Production in a U-Loop Reactor**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 88

Petersen, Nanna; Stocks, Stuart; Eliasson Lantz, Anna; Gernaey, Krist. **Sammenligning af avancerede online sensorer til måling af biomassekoncentrationen i filamentøse fermenteringer**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 180-181

Prado Rubio, Oscar Andres; Jørgensen, Sten Bay; Jonsson, Gunnar Eigil. **Control System Development for Integrated Bioreactor and Membrane Separation Process**. Presented at: European Symposium on Computer Aided Process Engineering, 2010 20th European Symposium of Computer Aided Process Engineering Volume 28; Volume 28, 289-294

Prado Rubio, Oscar Andres; Jørgensen, John Bagterp; Jørgensen, Sten Bay. **Systematic Model Analysis for Single Cell Protein (SCP) Production in a U-Loop Reactor**. Presented at: European Symposium on Computer Aided Process Engineering, 2010 Computer-Aided Chemical Engineering Series; Volume 28, 319-324

Rasmussen, Henrik K.; Hassager, Ole. **Does the interchain pressure effect exist in flow of polymer melt?**. Presented at: Annual European Rheology Conference. Göteborg, Sweden, 2010 AERC 2010

Roman Martinez, Alicia; Gani, Rafiqul; Woodley, John. **Model-based design and analysis of integrated biocatalytic processes**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 135

Rype, Jens-Ulrik; Garde, Arvid; Jonsson, Gunnar Eigil. **Combining membrane separation technology and fermentation processes for improved performances**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 26

PUBLICATIONS CONTINUED

Sansonetti, Sascha; Curcio, Stefano; Calabrò, Vincenza; Sin, Gürkan; Iorio, Gabriele. **Feasibility of the batch fermentation process of Ricotta Cheese Whey (RCW)**. Presented at: IBIC2010. Padua, Italy, 11-14 April, 2010 Chemical Engineering Transaction; Vol. 20, 79-84

Sin, Gürkan. **Uncertainty in modelling, design and operation of chemical processes**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 44

Sin G, Ruano MV, Neumann MB, Ribes J, Gernaey KV, Ferrer J, van Loosdrecht MCM, Gujer W (2010). **Sensitivity analysis in the WWTP modelling community – new opportunities and applications**. Proceedings 2nd IWA/WEF Wastewater Treatment Modelling Seminar Mont-Sainte-Anne, Quebec, Canada. March 28-30, 2010. PP 151-162.

Tindal, Stuart; Xue, R.; Archer, I.V.J.; Carr, R.; Farid, S.; Hailes, H.C.; Woodley, John. **Enzymatic Bioprocess Considerations when Changing Substrate**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 201

Vennestrøm, Peter Nicolai Ravnborg; Pedersen, Sven; Christensen, Claus H.; Grunwaldt, Jan-Dierk; Woodley, John. **Combining enzymes with heterogeneous chemical catalysts: chemoenzymatic combination of oxidase enzymes with titanium silicalite-1**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 184-185

von Solms, Nicolas; Woodley, John; Johnsson, Jan Erik; Abildskov, Jens. **Integrating chemical engineering fundamentals in the capstone process design project**. Presented at: CDIO conference. Montreal, Canada, 2010 Proceedings of CDIO conference

Voss, Bodil; Grunwaldt, Jan-Dierk; Woodley, John; Andersen, Simon Ivar. **Chemicals from Biomass: Sustainability and Feasibility of a Cu-based Catalyst**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 112-113

Völcker, Carsten; Jørgensen, John Bagterp; Thomsen, Per Grove; Stenby, Erling Halfdan. **Adaptive Step Size Control in Implicit Runge-Kutta Methods for Reservoir Simulation**. Presented at: 9th International Symposium on Dynamics and Control of Process Systems, 2010 9th International Symposium on Dynamics and Control of Process Systems

Völcker, Carsten; Jørgensen, John Bagterp; Thomsen, Per Grove; Stenby, Erling Halfdan. **Explicit Singly Diagonally Implicit Runge-Kutta Methods and Adaptive Stepsize Control for Reservoir Simulation**. Presented at: 12th European Conference on the Mathematics of Oil Recovery. Oxford, England, 2010 12th European Conference on the Mathematics of Oil Recovery, P005

Wu, Hao; Glarborg, Peter; Dam-Johansen, Kim; Frandsen, Flemming; Jensen, Peter Arendt; Sander, B.. **Behaviors of trace element in co-combustion of solid: Impacts of Fuel Quality on Power Production and the environment**. Presented at: Impacts of Fuel Quality in Power Production and the Environment, 2010 Impacts of fuel quality, Power production and environment, 18

Wu, Hao; Glarborg, Peter; Dam-Johansen, Kim; Jensen, Peter Arendt; Frandsen, Flemming; Sander, B.. **Co-combustion of solid recovered fuel with coal in an entrained flow reactor and the effect of additives: The 35th International Technical Conference on Clean Coal & Fuel Systems**. Presented at: The 35th International Technical Conference on Clean Coal & Fuel Systems, 2010 Combustion and Flame, 12

Yuan, Linfeng; Jonsson, Gunnar Eigil; Woodley, John; Korsholm, Lars. **Electro-membrane filtration for amino acid separation**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010, 162

Zahid, Adeel; Stenby, Erling Halfdan; Shapiro, Alexander. **Improved Oil Recovery in Chalk: Wettability Alteration or Something Else?**. Presented at: SPE EUROPEC/EAGE Annual Conference and Exhibition. Barcelona, Spain, 2010 SPE EUROPEC/EAGE Annual Conference and Exhibition SPE 131300

Zhang, Xuan. **COMSOL Implementation for Two-Phase Immiscible Flows in Layered Reservoir**. Presented at: European COMSOL Conference. Paris, France, 2010 Proceedings from European COMSOL Conference

Zhang, Xuan. **Upscalling of Waterflooding in Porous Media**. Presented at: 12th European Conferenc on the Mathematics of Oil Recovery. Oxford, United Kingsom, 2010 Proceedings from 12th European Conference on the Mathematics of Oil Recovery

Yan, W. and Stenby, E.H. 2010: **The Influence of CO_2 Solubility in Brine on Simulation of CO_2 Injection into Water Flooded Reservoir and CO_2 WAG** (Oral presentation), SPE EUROPEC/EAGE Annual Conference and Exhibition, Barcelona, Spain, 14-17 June 2010, Paper SPE 131094.

Conference Papers Published in Journal

Khvostichenko, Daria S; Andersen, Simon Ivar. (2010). **Electrodeposition of Asphaltenes. 2. Effect of Resins and Additives.** Presented at: International Conference on Petroleum Phase Behavior and Fouling. Rio de Janeiro, BRAZIL, 2009 Energy & Fuels, 24, 2327-2336

Meyer, Anne S.. (2010). **Enzyme technology for precision functional food ingredient processes**. Presented at: Conference on Foods for Health in the 21st Century. Univ Calif Davis, Davis, CA,, 2008 New York Academy of Sciences. Annals: Foods for Health in the 21st Century: A Road Map for the Future, 1190, 126-132

Nielsen, Sidsel Marie; Jessen, K.; Shapiro, Alexander; Michelsen, Michael Locht; Stenby, Erling Halfdan. (2010). **Microbial Enhanced Oil Recovery: 3D Simulation with Gravity Effects**. Presented at: EUROPEC/EAGE Conference and Exhibition. Barcelona, Spain, 2010 SPE 131048

Pedersen, Anne Juul; Wu, Hao; Frandsen, Flemming; Sander, Bo. (2010). **Combustion Aerosols from co-firing of Coal**. Presented at: Co-firing Aerosols AJP Fuel Quality Paper, 2010 Impacts of fuel quality, Power production and environment, 15

Yan, Wei; Stenby, Erling Halfdan. (2010). **The Influence of CO_2 Solubility in Brine on Simulation of CO_2 Injection into Water Flooded Reservoir and CO_2 WAG**. Presented at: SPE EUROPEC/EAGE Annual Conference and Exhibition. Barcelona, Spain, 2010 SP E, 131094

Books

Kontogeorgis, Georgios; Folas, Georgios. **Thermodynamic Models for Industrial Applications: From Classical and Advanced Mixing Rules to Association Theories** - Wiley, 2010 (710)

Contributions to Books

Eliasson Lantz, Anna; Gernaey, Krist; Franzén, C.J.; Olsson, Lisbeth. **On-line monitoring of fermentation processes in lignocellulose-to-bioalcohol production** Bioalcohol production. Biochemical conversion of lignocellulosic biomass, (Ed. K. Waldron) Woodhead Publishing Ltd., Oxford, pp 315-339

Gani, Rafiqul; Soni, Vipasha; Mitkowski, Piotr Tomasz. **Computer aided model based design and analysis of hybrid membrane reaction, separation process** Comprehensive Membrane Science and Engineering: Chemical and biochemical transformations in membrane systems; Book 3 Section 1 Part 3

Gani, Rafiqul; Matos, Henrique A.; Carvalho, Ana Isabel Cerqueira de Sousa Gouveia. **Sustainable Chemical Process Design** Managing CO_2 Emissions in the Chemical Industry: Chapter 5 , 159-188

Jonsson, Gunnar Eigil; Macedonia, Francesca. **Fundamentals in reverse osmosis** Comprehensive Membrane Science and Engineering: Membrane operations in molecular separations ; Book 2 Section 1 Part 1, 1-21

Wohlgemuth, Roland; Woodley, John. **Asymmetric Baeyer-Villiger Reactions using Whole-cell Biocatalysts** Asymmetric Catalysis on Industrial Scale: Challenges, Approaches and Solutions, Second Edition, (Eds H-U Blaser and H-J Federsel), John Wiley and Sons Inc. Hoboken, pp, 231-248.

Wohlgemuth, Roland; Smith, Mark E.B.; Dalby, Paul A.; Woodley, John M. **Transketolases** Encyclopedia of Industrial Biotechnology: Bioprocess, Bioseparation and Cell Technology, (Ed MC Flickinger) John Wiley and Sons Inc, Hoboken, Vol 7 pp 4762-4752.

PhD Dissertations

Alvarado, Merlin. **Process-product synthesis, design and analysis through the Group Contribution (GC) approach**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010

Andric, Pavle. **Pre-Treatment (and Enzymatic Hydrolysis) of Ligno-Cellulose**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010

Avlund, Ane Søgaard. **Extension of association models to complex chemicals** – Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010 (169)

Brix, Jacob. **Oxy-Fuel Forbrænding af Faste Brændsler**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010

Christensen, Jakob Munkholt. **Katalytisk syntese af langkædede alkoholer fra syntesegas**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010

Conte, Elisa. **Innovation in Integrated Chemical Product-Process Design - Development through a Model-based Systems Approach**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010

Faramarzi, Leila. **Post-Combustion Capture of CO_2 from Fossil Fueled Power Plants**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010 (96)

Fonseca, José. **Design, Development and Testing of New Experimental Equipment for the Measurement of Multiphase Equilibrium**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010 (297)

Guo, Fengxiao. **Functional Nanoporous Polymers from Block Copolymer Precursors**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010 (138)

Heiredal, Michael Lykke. **Particle Dynamics in Monolithic Catalysts**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010 (316)

PUBLICATIONS CONTINUED

Javakhishvili, Irakli. **Nanoscale Polymeric Amphiphiles by Combination of Controlled Polymerizations and "Click" Reactions: Implications for Drug Delivery**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010 (104)

Jensen, Lars. **Experimental investigation and molecular simulation of gas hydrates**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010 (196)

Jensen, Mette Krog. **Rheology of Cross-linked Polymer Networks**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010 (119)

Lundsgaard, Rasmus. **M igration of plasticisers from PVC and other polymers** – Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010 (151)

Nielsen, Sidsel Marie. **Microbial Enhanced Oil Recovery - Advanced Reservoir Simulation**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010 (125)

Niu, Ben. CO_2 Flooding in Chalk Reservoirs. **Experiments with X-Ray Computed Tomography and Reactive Transport Modelling** – Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010 (177)

Pauw, Brian Richard. **The Nanostructure of High-performance Fibres**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010 (190)

Pedersen M., Viksø-Nielsen A., Meyer A.S. 2010. **Monosaccharide and lignin yield from wheat straw in response to pH and catalyst type during mild thermal pretreatment**. Process Biochem. 45, 1181-1186

Pedersen M., Meyer A.S. 2010. **Lignocellulose pretreatment – understanding biomatrix opening in relation to temperature and pH during pretreatment**. New Biotechnol. 27(6) 739-750.

Petersen Rønnest, Nanna. **Analysis of Multivariate Sensor Data for Monitoring of Cultivations**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010

Prado Rubio, Oscar Andres. **Integration of Bioreactor and Membrane Separation Processes: A Model Based Approach**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010

Puder, Katja. **Mechanisms of Enzymatic Inactivation in the Animal Feed Pelleting Process**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010

Schäpper, Daniel. **Continuous Culture Microbioreactors**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010

Sørensen, Per Aggerholm. **High-Performance Anticorrosive Coatings**. - Kgs. Lyngby, Denmark: Technical University of Denmark (DTU), 2010

Other Publications

Reports

Fosbøl, Philip L. ; Borup, **Mia Trolle;s: Kontogeorgis, Georgios Kontogeorgis; Faramarzi, Leila Modeling of CO_2 Capture – extended report** (confidential)

Gani, Rafiqul. **CAPEC Research Report 2010**, 2010

Glarborg, Peter; Mendiara, Teresa. **Chemical loop reforming of generator gas: Interim report**, 2010 (5)

Hansen, Brian Brun; Jensen, Peter Arendt; Jensen, Anker Degn. **REBECA - WP IV - Emissions from engines using biodiesel: Literature survey**, 2010

Jensen, Peter Arendt; Dam-Johansen, Kim; Frandsen, Flemming; Bøjer, Martin; Kløft, Henrik; Nesterov, Igor; Hyks, Jiri; Astrup, Thomas; Lundtorp, Kasper; Madsen, Ole Hedegaard. **Improved electrical efficiency and bottom ash quality on waste combustion plants**, 2010 (18)

Editorial Material

Bracewell, Daniel; Gernaey, Krist; Glassey, Jarka; Hass, Volker C.; Heinzle, Elmar; Mandenius, Carl-Fredrik; Olsson, Ing-Marie; Racher, Andy; Staby, Arne; Titchener-Hooker, Nigel. (2010). **Report and recommendation of a workshop on education and training for measurement, monitoring, modelling and control ((MC)-C-3) in biochemical engineering** Biotechnology Journal, 5(4), 359-367

Conference Presentations

Abd.Hamid, Mohd-Kamaruddin; Sin, Gürkan; Gani, Rafiqul. **Application of Decomposition Methodology to Solve Integrated Process Design and Controller Design Problems for Reactor-Separator-Recycle Systems**. Presented at: CAPE Forum. Aachen, Germany, 11-12 March, 2010

Abd.Hamid, Mohd-Kamaruddin; Sin, Gürkan; Gani, Rafiqul. **Application of Decomposition Methodology to Solve Integrated Process Design and Controller Design Problems for Reactor-Separator-Recycle Systems**. Presented at: 9th International Symposium on Dynamics and Control of Process Systems, DYCOPS. Leuven, Belgium, 7-9 July, 2010

Abd.Hamid, Mohd-Kamaruddin; Sin, Gürkan; Gani, Rafiqul. **Application of Decomposition Methodology to Solve Integrated Process Design and Controller Design Problem for Reactor-Separator-Recycle System**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010

Abdul Samad, Noor Asma Fazli; Singh, Ravendra; Sin, Gürkan; Gernaey, Krist; Gani, Rafiqul. **A Generic Model-Based Framework for Batch Cooling Crystallization Processes**. Presented at: 4th International Conference on Population Balance Modeling (PBM 2010). Berlin, Germany, 2010

Abdul Samad, Noor Asma Fazli; Singh, Ravendra; Sin, Gürkan; Gernaey, Krist; Gani, Rafiqul. **A Generic Multi-Dimensional Model-Based Framework for Batch Cooling Crystallization Process**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Abdul Samad, Noor Asma Fazli; Singh, Ravendra; Sin, Gürkan; Gernaey, Krist; Gani, Rafiqul. **Control of Process Operations and Monitoring of Product Qualities through Generic Model-based in Batch Cooling Crystallization**. Presented at: ESCAPE20. Ischia, Naples, Italy, 6-9 June, 2010

Aguirre, C.; Cisternas, L.; Gani, Rafiqul. **Computer-aided design of ionic-liquids by group contribution methods**. Presented at: PPEPPD-2010. Suzhou, Jiangsu, China, 16-21 May, 2010

Al-Haque, Naweed; Tufvesson, Pär; Gani, Rafiqul; Woodley, John. **Application of Solid Resins for Controlled Substrate supply to biocatalytic reactions**. Presented at: BEST 2010. Bologna, Italy, 2010

Albæk, Mads Orla; Gernaey, Krist; Hansen, M.S.; Stocks, Stuart M.. **Comparison of Traditional Rushton Disc Turbines with Up-pumping Hydrofoil B2 Impellers in 550 L Pilot Scale Aerobic Submerged Fermentations**. Presented at: Dansk Kemiingeniørkonference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010

Ale, Marcel Tutor; Mikkelsen, Jørn Dalgaard; Meyer, Anne S. **N-uptake and growth monitoring of the macrophyte Ulva lactuca by photo-scanning technology**. Presented at: 20th International Seaweed Symposium. Enzenada, Baja California, Mexico, 2010

Alvarado, Merlin; Gernaey, Krist; Woodley, John; Gani, Rafiqul. **Synthesis, Design and Analysis of Downstream Separation in Bio-refinery Processes through a Group-Contribution Approach**. Presented at: ESCAPE20. Ischia, Naples, Italy, 6-9 June, 2010

Andrade Santacoloma, Paloma de Gracia; Sin, Gürkan; Gernaey, Krist; Woodley, John. **Sensitivity Analysis of a Kinetic Model Describing the Bi-enzymatic Synthesis of Lactobionic Acid**. Presented at: ESCAPE20. Ischia, Naples, Italy, 6-9 June, 2010

Andrade Santacoloma, Paloma de Gracia; Sin, Gürkan; Gernaey, Krist; Woodley, John. **New concepts for multi-enzymatic synthetic processes**. Presented at: BEST 2010. Bologna, Italy, 5-8 September, 2010

Andrade Santacoloma, Paloma de Gracia; Sin, Gürkan; Gernaey, Krist; Woodley, John. **New concepts for multi-enzymatic synthetic processes**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010

Babi, Deenesh Kavi; Price, Jason; Gani, Rafiqul. **Systematic Design of An Acetaldehyde Process**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Beier, Matthias Josef; Tsivintzelis, Ioannis; Kontogeorgis, Georgios; Grunwaldt, Jan-Dierk. **Tuning the catalytic Activity in the Selective Aerobic Alcohol Oxidation in Supercritical CO_2 by Modeling the Phase Behavior**. Presented at: Dansk Kemiingeniør Konference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010, 174-175

Bejenariu, Anca Gabriela. **Dynamics of silicone based networks. Application as electroactive polymers: Large Amplitude Oscillatory Extension of Soft Polymeric Networks**. Presented at: Summer School of Rheology, 2010 SSR Summer School of Rheology

Bejenariu, Anca Gabriela; Rasmussen, Henrik K.; Auhl, Dietmar; Skov, Anne Ladegaard; Hassager, Ole. **Reversed extensional flow on polyisoprene melts**. Presented at: Annual European Rheology Conference. Sweden, 2010

Bejenariu, Anca Gabriela; Skov, Anne Ladegaard; Hassager, Ole. **Silicone based electroactive polymers: application driven development**. Presented at: DK2, 2010

PUBLICATIONS CONTINUED

Bialas, Dawid Jan; Huusom, Jakob Kjøbsted; Jørgensen, John Bagterp; Sin, Gürkan. **Model predictive control for plant-wide control of a reactor-separator-recycle system**. Presented at: 16th Nordic Process Control Workshop – NPCW16. Lund, Sweden, 26-27 August, 2010

Bialas, Dawid Jan; Huusom, Jakob Kjøbsted; Jørgensen, John Bagterp; Sin, Gürkan. **Model predictive control for reactor-separator-recycle system**. Presented at: Dansk Kemiingeniørkonference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010

Breil, M.P., Tsivintzelis, I., Kontogeorgis, G.M. 2010: **Modelling the Phase Equilibria with CPA using the Homomorph Approach** (Poster presentation), Conference on Molecular Modeling and Simulation for Industrial Applications: Physico-Chemical Properties and Processes, Wurzburg, Germany, March, 2010

Brix, Jacob; Jensen, Peter Arendt; Jensen, Anker Degn. **Pyrolyse og forbrænding af kul i N_2/O_2 og CO_2/O_2 atmosfærer**. Presented at: Dansk Kemiingeniør Konference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010, 150-151

Carvalho, Ana; Gani, Rafiqul; Matos, Henrique. **Design of sustainable processes: Systematic generation and evaluation of alternatives (Best Paper Award)**. Presented at: 2nd Annual Gas Processing Symposium 2010. Doha, Qatar, 11-14 January, 2010

Cervera Padrell, Albert Emili; Gernaey, Krist; Gani, Rafiqul; Kiil, Søren; Skovby, Tommy. **Design of Continuous Processes for Organic-Synthesis Based Production of Active Pharmaceutical Ingredients - a Methodology**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Cervera Padrell, Albert Emili; Gernaey, Krist; Gani, Rafiqul; Kiil, Søren; Skovby, Tommy. **Moving from batch toward continuous organic-chemical pharmaceutical production**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010

Christensen, Jakob Munkholt; Jensen, Peter Arendt; Jensen, Anker Degn. **Catalytic conversion of synthesis gas into higher alcohols**. Presented at: Dansk Kemiingeniør Konference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010, 107-108

Conte, Elisa; Gani, Rafiqul. **Formulation design: managing the complexity through the Virtual Laboratory**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010

Conte, Elisa; Gani, Rafiqul. **Managing the Complexity in Liquid Formulation Design**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Conte, Elisa; Gani, Rafiqul; Malik, Tahir I.. **The Virtual Product-Process Design Laboratory to Manage the Complexity in Formulation Design**. Presented at: PPEPPD-2010. Suzhou, Jiangsu, China, 16-21 May, 2010

Conte, Elisa; Gani, Rafiqul; Malik, Tom. **The Virtual Product-Process Laboratory applied to personal care formulations**. Presented at: ESCAPE20. Ischia, Naples, Italy, 6-9 June, 2010

Corominas Ll., Rieger L., Takács I., Ekama G., Hauduc H., Vanrolleghem P.A., Oehmen A., Gernaey K.V., van Loosdrecht M.C.M. and Comeau Y. (2010) **New framework for standardized notation in wastewater treatment modelling**. Presented at: Proceedings of the 83rd Annual Conference of the Water Environment Federation (WEFTEC), October 2 – 6 2010, New Orleans, Louisiana, USA.

Dam-Johansen, Kim. **CO_2 Capture by Carbonate Looping**. Presented at: Dansk Kemiingeniør Konference. Lyngby, Denmark, 16-17 June, 2010 Proceedings of Dansk Kemiingeniørkonference, 154-155

Dam-Johansen, Kim. **Kernediscipliner i Aktivt Samspil med Anvendelser**. Presented at: Dansk Kemiingeniør Konference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010

Darde, Victor. **CO_2 capture using aqueous ammonia: kinetic study and process simulation.** Presented at GHGT10 (Greenhouse Gas Technology 10), Amsterdam, the Netherlands, 19-23rd September 2010

Díaz Tovar, Carlos Axel; Gani, Rafiqul; Sarup, Bent. **Lipid Technology: Merging Property Prediction & process Design/Analysis in the Edible Oil Industry**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010

Díaz Tovar, Carlos Axel; Gani, Rafiqul; Sarup, Bent. **Lipid technology: Property prediction and process design/analysis in the edible oil industry**. Presented at: PPEPPD-2010. Suzhou, Jiangsu, China, 16-21 May, 2010

Díaz Tovar, Carlos Axel; Gani, Rafiqul; Sarup, Bent. **Methods and Tools to Overcome the Lack of Data in Property Prediction in Lipid Processing Technology**. Presented at: 21st IUPAC International Conference on Chemical Thermodynamics ICCT-2010. Tsukuba, Japan, 31 July – 6 August, 2010

Díaz Tovar, Carlos Axel; Gani, Rafiqul; Sarup, Bent. **Property Prediction for Lipids Based Product Design and Analysis**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Díaz Tovar, Carlos Axel; Gani, Rafiqul; Sarup, Bent. **Towards the Merging of Property Prediction & Process Design/Analysis in the Edible Oil Industry**. Presented at: CAPE Forum 2010. Aachen, Germany, 11-12 March, 2010

Eeclo, Jonas; Tsai, Chien-Tai; Morales Rodriguez, Ricardo; Gernaey, Krist; Meyer, Anne S.; Sin, Gürkan. **A Dynamic Model for Cellulosic Biomass Hydrolysis: Validation of Hydrolysis and Product Inhibition Mechanism**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Ellegaard, Martin Dela; Abildskov, Jens; O'Connell, John P.. **Modellering af opløseligheder i systemer med blandede solventer**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010

Fettouhi, A. 2010 **Solid-Liquid Equilibria for Many-component Mixtures Using Cubic-Plus-Association (CPA) Equation of State**. (Poster presentation), Dansk KemiingeniørKonference - DK2, Technical University of Denmark, Lyngby, Danmark, 16 June, 2010

Feyissa, Aberham Hailu; Adler-Nissen, Jens; Gernaey, Krist. **Approaches to Robust Modelling of Frying Processes**. Presented at: Dansk Kemiingeniørkonference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010

Feyissa, Aberham Hailu; Adler-Nissen, Jens; Gernaey, Krist. **Uncertainty and Sensitivity Analysis of Heat and Mass Transfer in Food Processing**. Presented at: 5th International Conference on the Food Factory for the Future. Gothenburg, Sweden, 2010

Fristrup, Charlotte Juel; Jankova Atanasova, Katja; Hvilsted, Søren. **Inhibition of Protein Adsorption by Grafting Hydrophilic Polymers from Polypropylene**. Presented at: 6th Annual Polymer Day. DTU, Lyngby, Denmark, 2010

Fu, Wenjing; Jensen, Jacob Skibsted; Boisen, A; Pedersen, S.; Riisager, Anders; Gani, Rafiqul; Woodley, John. **Process Design for Chemo-enzymatic Synthesis of 2,5-Furandicarboxylic Acid**. Presented at: 2nd International Symposium on Sustainable Chemical Product and Process Engineering. Hangzhou, China, 9-12 May, 2010

Fu, Wenjing; Jensen, Jacob Skibsted; Boisen, A.; Pedersen, S.; Riisager, Anders; Gani, Rafiqul; Woodley, John. **Process Design for Chemo-enzymatic Synthesis of 2,5-Furandicarboxylic Acid (Best Poster Award)**. Presented at: 2. International Symposium on Sustainable Chemical Product and Process Engineering. Hangzhou, China, 9-12 May, 2010

Fu, Wenjing: Jensen, Jacib Skibsted; Riisager, Anders; Gani, Rafiqul; Woodley, John M; Boisen, A; Pedersen S. **Process design for chemo-enzymatic synthesis of 5-hydroxymethylfurfural**. Presented at BEST 2010, Bologna, Italy, 5-8 September 2010.

Fu, Wenjing; Jensen, Jacob Skibsted; Riisager, Anders; Pedersen, S.; Gani, Rafiqul; Woodley, John. **Process design for chemo-enzymatic synthesis of 5-hydroxymethylfurfural**. Presented at: BEST 2010. Bologna, Italy, 5-8 September, 2010

Fu, Wenjing; Boisen, Astrid; Pedersen, Sven; Gani, Rafiqul; Woodley, John; Jensen, Jacob Skibsted; Riisager, Anders. **Process Design for Chemo-enzymatic Synthesis of 5-Hydroxymethylfurfural**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 16-17 June 2010

Gani, Rafiqul. **A process systems engineering approach to managing the complexity in chemical product process design**. Presented at: Invited Seminar, Tsinghua University; Beijing, China, 14 May, 2010

Gani, Rafiqul. **Computer aided molecular and blend design applied to fuel-related products (Invited Lecture)**. Presented at: 3rd TMFB International Workshop. RWTH Aachen, Germany, 23-24 June, 2010

Gani, Rafiqul. **Design and synthesis of sustainable chemical and biochemical processes**. Presented at: Invited Seminar, PPC, Chulalongkorn University. Bangkok, Thailand, 5 October 2010, 2010

Gani, Rafiqul. **Design challenges and sustainability issues in gas processing: A view from academia (Invited Lecture)**. Presented at: 2nd Annual Gas Processing Symposium, Doha, Qatar, 11-14 January, 2010

Gani, Rafiqul. **Managing Complexity in Product Process Engineering**. Presented at: Invited Seminar, Mitsubishi Chemical Corporation, Kashima Plant, Kashima, Japan, 3 August, 2010

Gani, Rafiqul. **Managing the Complexity in Product and Process Engineering**. Presented at: 2010 Fall J.D. Lindsay Lecture Series. Texas A&M University, USA, 27 October, 2010

Gani, Rafiqul. **Managing the complexity in product and process engineering**. Presented at: Yonsei University, South Korea. Yonsei University, South Korea, 1 December, 2010

Gani, Rafiqul. **Property modeling for applications in chemical product and process design**. Presented at: Invited Seminar, University of Ghent, Belgium, 12 July, 2010

Gani, Rafiqul. **Property Modelling for Applications in Chemical Product and Process Design (Invited Lecture)**. Presented at: 21st IUPAC International Conference on Chemical Thermodynamics ICCT-2010. Tsukuba, Japan, 31 July – 6 August, 2010

Gani, Rafiqul. **Property modelling for applications in product and process Engineering**. Presented at: Sogang University, South Korea, 30 November, 2010

PUBLICATIONS CONTINUED

Gani, Rafiqul. **Solvent Selection and Design**. Presented at: Invited Seminar, RWTH Aachen, Germany, 22 January, 2010

Gani, Rafiqul. **Solvents, green chemistry and sustainable product-process design (Plenary Lecture)**. Presented at: 2nd International Symposium on Sustainable Chemical Product and Process Engineering. Hangzhou, China, 9-12 May, 2010

Gani, Rafiqul. **Solvents, green chemistry and sustainable product-process design**. Presented at: Invited Seminar, TU-Delft, TU-Eindhoven, University of Twente, The Netherlands, 7-9 April, 2010

Gani, Rafiqul. **Solvents, green chemistry and sustainable product-process design (Invited Plenary Lecture)**. Presented at: Slovenian Chemical Technology Conference 2010. Ljubljana, Slovenia, 23 September, 2010

Gani, Rafiqul. **Solvents, green chemistry and sustainable product-process design**. Presented at: Korea University, Seoul, South Korea, 1 December, 2010

Gani, Rafiqul. **Sustainable Chemical and Bio-chemical Process Design**. Presented at: GlaxoSmithKline. Philadelphia, USA, 15 November, 2010

Gani, Rafiqul. **Sustainable design of chemical and bio-chemical processes**. Presented at: Korea University, Seoul, South Korea, 2 December, 2010

Gani, Rafiqul. **Thermodynamics – our molecular sister or just a forgotten relative? (Invited Lecture)**. Presented at: CAPE Forum 2010. Aachen, Germany, 11-12 March, 2010

Gernaey, Krist; Schäpper, Daniel; Zainal Alam, Muhd Nazrul Hisham; Bolic, Andrijana. **Microreactors for Application in biotech Process Development**. Presented at: Dansk Kemiingeniørkonference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010

Gernaey, Krist; Tufvesson, Pär; Woodley, John. **Process Development and Design for Greener Pharmaceutical Processes**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Gorbanev, Yury; Kegnæs, Søren; Woodley, John; Christensen, Claus H.; Riisager, Anders. **Renewable building block for plastic industry: Gold-catalyzed oxidation of HMF to FDA in water**. Presented at: Nordic Symposium on Catalysis. Marienlyst, Denmark, 29-31 August, 2010

Grant, C.; Pinto, Ana Paula Teixeria; Yan, Wei; Woodley, John; Baganz, F.. **Scale-down and design of experiments in improving bio-oxidation of long-chain alkanes**. Presented at: Zing Biocatalysis conference. Puerto Morelos, Mexico, 10-13 December, 2010

Grant, C.; Woodley, John; Baganz, F.. **Scale down and design of experiments toward improving bio-oxidation of alkanes**. Presented at: Biocat2010. Hamburg, Germany, 29 August - 2 September, 2010

Hansen, Thomas Steen; Lind, Johan Ulrik; Daugaard, Anders Egede; Hvilsted, Søren; Larsen, Niels Bent. **"Electro-Click" on Conducting Polymer Films**. Presented at: International Conference on science and technology of Syntetic Metals. Kyoto, Japan, 2010

Heitzig, Martina; Sin, Gürkan; Glarborg, Peter; Gani, Rafiqul. **A computer-aided framework for regression and multi-scale-modelling needs in innovative product-process engineering**. Presented at: ESCAPE20. Ischia, Naples, Italy, 6-9 June, 2010

Heitzig, Martina; Sin, Gürkan; Glarborg, Peter; Gani, Rafiqul. **A Computer-Aided Framework for Systematic Model Development, Analysis, and Identification in Innovative Product-Process Engineering**. Presented at: 6th International Conference on Sensitivity Analysis of Model Output. Milan, Italy, 19-22 July, 2010

Heitzig, Martina; Sin, Gürkan; Glarborg, Peter; Gani, Rafiqul. **A computer-aided modelling framework for use in product-process engineering**. Presented at: CHISA2010/ ECCE-7. Prague, Czech Republic, 28 August – 1 September, 2010

Heitzig, Martina; Sin, Gürkan; Glarborg, Peter; Gani, Rafiqul. **Computer-Aided Modelling for Efficient and Innovative Product-Process Engineering**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010

Heitzig, Martina; Sin, Gürkan; Glarborg, Peter; Gani, Rafiqul. **ICAS-MoT, a Computer-Aided Modeling Tool**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Heitzig, Martina; Sin, Gürkan; Glarborg, Peter; Gani, Rafiqul. **Managing Multi-Scale Modeling Issues in Chemical Engineering - a Computer-Aided Framework**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Hemmingsen, Lene; Holck, Jesper; Meyer, Anne S.; Wilcks, Andrea; Licht, Tine Rask. **Effects of specific carbohydrates on the intestinal microbiota**. Presented at: TNO Beneficial Microbes Conference. The Netherlands, 2010

Huusom, Jakob Kjøbsted; Poulsen, Niels Kjølstad; Jørgensen, Sten Bay; Jørgensen, John Bagterp. **ARX-based Model Predictive Control of Systems with Time Delays**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Huusom, Jakob Kjøbsted; Poulsen, Niels Kjølstad; Jørgensen, Sten Bay; Jørgensen, John Bagterp. **ARX-Model based Model Predictive Control with Offset-Free Tracking**. Presented at: ESCAPE20. Ischia, Naples, Italy, 6-9 June, 2010

Huusom, Jakob Kjøbsted; Poulsen, Niels Kjølstad; Jørgensen, Sten Bay; Jørgensen, John Bagterp. **Tuning of ARX-based Model Predictive Control for Offset-free Tracking**. Presented at: CAPE Forum. Aachen, Germany, 11-12 March, 2010

Huusom, Jakob Kjøbsted; Poulsen, Niels Kjølstad; Jørgensen, Sten Bay; Jørgensen, John Bagterp. **Tuning of ARX-based Model Predictive Control for Offset-free Tracking**. Presented at: Nordic Process Control Workshop - NPCW16. Lund, Sweden, 26-27 august 2010

Huusom, Jakob Kjøbsted; Poulsen, Niels Kjølstad; Jørgensen, Sten Bay; Jørgensen, John Bagterp. **Tuning of ARX-based Model Predictive Control for Offset-free Tracking**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010

Hvilsted, Søren; Javakhishvili, Irakli. **Biomedical Materials Based on Polycaprolactone Scaffolds**. Presented at: DK 2. DTU, Kgs. Lyngby, Denmark, 2010

Hvilsted, Søren. **Click Chemistry as a Versatile Tool in Design of Novel Complex Biomolecular Materials**. Presented at: STIPOMAT. Strasbourg, France, 2010

Hvilsted, Søren. **Efficient Electroclick and other Orthogonal Click Methods in Development of Challenging Biopolymer Materials**. Presented at: Polychar 18. Siegen, Germany, 2010

Hvilsted, Søren; Mortensen, Martin Nordvig. **Formic Acid as a Marker for Polyethylene Glycol Degradation in Conserved Archeological Wood - a Radiocarbon Study**. Presented at: International Conference on Wet Organic Archaeological Materials ICOM-WOAM. East Carolina University, Greenville, North Carolina, USA, 2010

Hvilsted, Søren; Fristrup, Charlotte Juel; Jankova Atanasova, Katja. **Insulin Exposed to Hydrophilic Polymer Coatings**. Presented at: Novo Nordisk Star Symposium. Novo Nordisk, Bagsværd, Denmark, 2010

Hvilsted, Søren; Javakhishvili, Irakli. **Miktoarm Core Cros-linked Sstar Polymer Derived from Linear-dendritic and Linear Macromonomers and its Prospective Click Modification**. Presented at: IUPAC World Polymer Congress: Polymer Science in the Service of Society. Glasgow, UK, 2010

Hvilsted, Søren; Javakhishvili, Irakli. **Nanomaterials Based on Polycaprolactone Scaffolds**. Presented at: Nordic Polymer Days 2010. Helsinki, Finland, 2010

Hvilsted, Søren. **Polymer design af nye funktionelle materialer**. Presented at: ATV årsmøde. Experimentarium, Copenhagen, Denmark, 2010

Hvilsted, Søren; Jankova Atanasova, Katja; Daugaard, Anders Egede. **Polystyrene Functionalization of an Industrial Grade of Multi Walled Carbon Nanotubes by Atom Transfer Radical Polymerization**. Presented at: 6th Annual Polymer Day. DTU, Lyngby, Denmark, 2010

Høj, Martin; Beier, Matthias Josef; Grunwaldt, Jan-Dierk; Dahl, Søren. **Characterization of Fe-zeolite catalysts for NH_3-scr OF NO_x in diesel exhaust**. Presented at: Dansk Kemiingeniør Konference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010

Ibragimova, Sania; Jensen, Karin Bagger Stibius; Szewczykowski, Piotr Przemyslaw; Perry, Mark; Helix Nielsen, Claus. **Encapsulation of multiple black lipid membranes**. Presented at: Biophysical society 54th Annual Meeting. San Francisco, USA, 2010 Biophysical Journal

Jain, P. **Compositional Simulation of In-Situ Combustion EOR: A Study of Process Characteristics** (Oral presentation), 2010 SPE Improved Oil Recovery Symposium held in Tulsa, Oklahoma, USA, 24–28 April, 2010

Javakhishvili, Irakli; Hvilsted, Søren. **Miktoarm Core Cross-linked Star Copolymer with Targeting Ligaqnds Based on Poly(ecaprolactone)**. Presented at: 6th Annual Polymer Day. DTU, Lyngby, Denmark, 2010

Jensen, Jacob Skibsted; Fu, Wenjing; Christensen, T.B.; Woodley, John. **Process considerations for the catalytic dehydration of sugars to 5-hydroxymethylfurfural**. Presented at: Nordic Symposium on Catalysis. Marienlyst, Denmark, 29-31 August, 2010

Jensen, Lars. **Inhibition of Gas Hydrate Formation by Antifreeze Proteins**. Presented at: Dansk Kemiingeniørkonference. Kgs. Lyngby, Denmark, 2010

Jensen, Lars. **The Stability of Methane Hydrate from Molecular Simulation**. Presented at: PPEPPD. Suzhou, China, 2010

Jensen, L. **Monte-Carlo Simulations of the Liquid Water-Hydrate-Methane Vapor Phase Equilibria** (Poster presentation) CECAM/ACAM workshop: Molecular Simulation of Clathrate Hydrates, Dublin, Ireland, May 6-8, 2010

Jensen, Mette Krog; Skov, Anne Ladegaard; Rasmussen, Henrik K.; Hassager, Ole. **Reversible large amplitude planar extension of soft elastomers**. Presented at: The Society of Rheology 82nd Annual Meeting. Santa Fe, New Mexico, 2010, MS2

PUBLICATIONS CONTINUED

Jensen, Mette Krog; Skov, Anne Ladegaard; Rasmussen, Henrik K.; Hassager, Ole. **Reversible planar elongational of soft polymeric networks**. Presented at: AERC 2010. Göteborg, Sweden, 2010

Kontogeorgis, Georgios; Tsivintzelis, Ioannis; Folas, G.; Michelsen, Michael Locht; Breil, M.P.; von Solms, Nicolas; Avlund, Ane Søgaard; Eriksen, D.; Grenner, A.; Tybjerg, P.; Stenby, Erling Halfdan. **Extensive Comparison of Cubic Plus Association (CPA) and PC-SAFT Equations of State**. Presented at: SAFT2010. Barcelona, Spain, 2010

Kontogeorgis, Georgios. **Thermodynamic Applications in Petroleum, Energy, Material/ Chemical and Biochemical Industries**. Presented at: University of Porto, Portugal, 2010

Kontogeorgis, G. M., Tsivintzelis, I., Folas, G.K., Michelsen, M.L. Michelsen and Stenby, EH. **Towards Predictive Association Theories** (Oral presentation), The 12th International Conference on Properties and Phase Equilibria for Product and Process Design, May, 2010, Suzhou, China, Article published in conference proceedings, Digital Edition.

Kranker, Tine; Svendsen, Lene; Lencastre Fernandes, Rita; Gernaey, Krist. **A Population Balance Model for Microbial Populations in Fermentors**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010

Kratzer, Regina; Mädje, K.; Schmölzer, K.; Nidetzky, B.; Woodley, John. **Whole cell reduction as a key step in the production of chiral drugs: a comprehensive engineering approach and evaluation methodology**. Presented at: BEST 2010. Bologna, Italy, 5-8 September, 2010

Lencastre Fernandes, Rita; Schäpper, Daniel; Okkels, Fridolin; Eliasson Lantz, Anna; Bruus, Henrik; Gernaey, Krist. **Structurally Optimized Microbioreactors: A Design Example for Immobilized Yeast Cultivations**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Lencastre Fernandes, Rita; Schäpper, Daniel; Okkels, Fridolin; Eliasson Lantz, Anna; Bruus, Henrik; Gernaey, Krist. **Structurally optimized microbioreactors for immobilized yeast cultivations**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010

Lencastre Fernandes R., Schäpper D., Okkels F., Eliasson Lantz A., Bruus H. and Gernaey K.V. (2010) **Structurally optimized microbioreactors for immobilized yeast cultivations**. Presented at: 8th European Symposium on Biochemical Engineering (ESBES8), Bologna, Italy, September 5 - 8, 2010.

Lencastre Fernandes R., Dutta A., Nopens I., Jensen A.D. and Gernaey K.V. (2010) **Population balance models for microbial populations: describing heterogeneity in fermentors**. Presented at: 4th International Conference on Population Balance Modelling (PBM 2010), Berlin, Germany, September 15 - 17, 2010.

Lin, Weigang; Jensen, Anker Degn; Sander, Bo. **Long Term Deactivation of SCR Catalysts during Co-firing of Coal and Straw**. Presented at: Dansk Kemiingeniør Konference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010, 204

Lundsgaard, Rasmus; Kontogeorgis, Georgios M.; Economou, Ioannis G.; Nielsen, Bjarne; Jensen, Torkil F. **Estimation of Migration and Diffusion Coefficients of GRINDSTED(R) SOFT-N-SAFE from PVC into Iso-octane**. Presented at: Dansk Kemiingeniørkonference. Kgs. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010: DK2

Lundsgaard, Rasmus; Kontogeorgis, Georgios M.; Economou, Ioannis G. **Modelling of Partition Coefficients of Additives in Polymer/solvent Systems by Free Energy Calculations**. Presented at: Molecular Modelling and Simulation for Industrial Applications: Physico-Chemical Properties and Processes. Wurzburg, Germany, 2010, Proceedings from Molecular Modelling and Simulation for Industrial Applications: Physico-Chemical Properties and Processes

Lundsgaard, Rasmus; Kontogeorgis, Georgios M.; Economou, Ioannis G. **Modelling of Partition Coefficients of Additives in Polymer/solvent Systems by Free Energy Calculations**. Presented at: 12th International Conference on Properties and Phase Equilibria for Product and Process Design. Suzhou, China, 2010 Proceedings from PPEPPD 2010

Lundsgaard, Rasmus; Kontogeorgis, Georgios M.; Economou, Ioannis G. **Modelling of Partition Coefficients of Additives in Polymer/solvent Systems by Free Energy Calculations**. Presented at: Dansk Kemiingeniørkonference. Kgs. Lyngby, Denmark, 2010 Proceedings of Dansk Kemiingeniørkonference 2010: DK2

Lutze, Philip; Jensen, Jacob Skibsted; Gani, Rafiqul; Woodley, John. **A systematic methodology to synthesize/design processes, incorporating process intensification**. Presented at: CHISA2010/ ECCE-7. Prague, Czech Republic, 28 August – 1 September, 2010

Lutze, Philip; Jensen, Jacob Skibsted; Gani, Rafiqul; Woodley, John. **A systematic synthesis and design methodology to achieve process intensification for multi-phase reactions**. Presented at: CHISA2010/ECCE-7. Prague, Czech Republic, 28 August – 1 September, 2010

Lutze, Philip; Román-Martinez, Alicia; Woodley, John; Gani, Rafiqul. **A systematic synthesis and design methodology to achieve process intensification in (bio) chemical processes**. Presented at: ESCAPE20. Ischia, Naples, Italy, 6-9 June, 2010

Lutze, Philip; Gani, Rafiqul; Woodley, John. **Application of a Synthesis and Design Methodology Incorporating Process Intensification**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Lutze, Philip; Gani, Rafiqul; Woodley, John. **Development of a Systematic Synthesis/Design Methodology incorporating Process Intensification**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 16-17 June, 2010

Lutze, Philip; Gani, Rafiqul; Woodley, John; Dada, Emmanuel A.. **Recent Advances in Reactive Distillation**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Lutze, Philip; Gani, Rafiqul; Woodley, John; Dada, Emmanuel A.,. **Recent Advances in Reactive Distillation**. Presented at: NSChE (Nigerian Society of Chemical Engineers), 40th Annual International Conference. Port Harcourt, Nigeria,18-20 November, 2010

Lutze, Philip; Gani, Rafiqul; Woodley, John; Dada, Emmanuel A.,. **Recent Advances in Reactive Distillation**. Presented at: NOBCChE (National Organization of Black Chemists and Chemical Engineers) Conference. University of Pennsylvania, Philadelphia, USA, 5-6 November, 2010

Martin, Breil; Tsivintzelis, Ioannis; Kontogeorgis, Georgios. **Modelling the Phase Equilibria with CPA using the Homomorph Approach**. Presented at: Conference on Molecular Modeling and Simulation for Industrial Applications: Physico-Chemical Properties and Processes. Wurzburg, Germany, 2010

Morales Rodriguez, Ricardo; Capron, Marie; Huusom, Jakob Kjøbsted; Sin, Gürkan. **Controlled fed-batch operation for enzymatic cellulose hydrolysis in 2G bioethanol production**. Presented at: ESCAPE20. Ischia, Naples, Italy, 6-9 June, 2010

Morales Rodriguez, Ricardo; Gernaey, Krist; Meyer, Anne S.; Sin, Gürkan. **Development of a mathematical model describing hydrolysis and co-fermentation of C_6 and C_5 sugars**. Presented at: 2nd International Symposium on Sustainable Chemical Product and Process Engineering. Hangzhou, China, 9-12 May, 2010

Morales Rodriguez, Ricardo; Gernaey, Krist; Meyer, Anne S.; Sin, Gürkan. **Dynamic plant-wide modelling for bioethanol production from lignocellulosic biomass (2G)**. Presented at: CHISA2010/ECCE-7. Prague, Czech Republic, 28 August – 1 September, 2010

Morales Rodriguez, Ricardo; Meyer, Anne S.; Gernaey, Krist; Sin, Gürkan. **From lab experiments to plant operation and design: Bioethanol production from lignocellulose using different enzyme technologies**. Presented at: 2nd Annual workshop on enzymatic hydrolysis of insoluble substrates. Holbæk, Denmark, 26-27 October, 2010

Morales Rodriguez, Ricardo; Gernaey, Krist; Meyer, Anne S.; Sin, Gürkan. **Integrated Dynamic Plant-Wide Model-Based Simulation of Bioethanol Production from Lignocellulose**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010

Morales Rodriguez, Ricardo; Gernaey, Krist; Meyer, Anne S.; Sin, Gürkan. **Integrated Dynamic Plant-Wide Model-Based Simulation of Bioethanol Production from Lignocellulose**. Presented at: Biokemisk Forening. Vejle, Denmark, 2010

Morales Rodriguez, Ricardo; Meyer, Anne S.; Gernaey, Krist; Sin, Gürkan. **Process Technology Evaluation for Lignocellulosic Bioethanol Production: Plantwide Configurations Using a Dynamic Modeling Approach**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Muller, F.; Sanchez, R. R.; Wrate, T.; Davison, S.; Manipura, A.; Martin, E. B.; Montague, G. A.; Kraut, M.; Haas-Santo, K.; Forsberg, K.; Rasmuson, A. C.; Singh, Ravendra; Gernaey, Krist; Gani, Rafiqul; Woodley, John. **F3 process design for fine chemical and Pharmaceutical transformations**. Presented at: CHISA2010/ECCE-7. Prague, Czech Republic, 28 August – 1 September, 2010

Mustaffa, Azizul Azri; Kontogeorgis, Georgios; Gani, Rafiqul. **Analysis and application of GC plus models for property prediction of organic chemical systems**. Presented at: PPEPPD-2010. Suzhou, Jiangsu, China, 16-21 May, 2010

N. Iyara, N. Iyara; Siemanond, K.; Gani, Rafiqul. **Sustainable design for an olefin process (Best Poster Award)**. Presented at: 2nd International Symposium on Sustainable Chemical Product and Process Engineering. Hangzhou, China, 9-12 May, 2010

PUBLICATIONS CONTINUED

Nesterova, Tatyana; Pedersen, Lars Thorslund; Dam-Johansen, Kim; Kiil, Søren. **Development of epoxy-based self-healing anticorrosive coating**. Presented at: Dansk Kemiingeniør Konference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010, 46-47

Nielsen, Anders Rooma; Larsen, Morten Boberg; Glarborg, Peter. **Fuel flexible rotary kilns for cement production**. Presented at: Dansk Kemiingeniør Konference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010, 33-34

Niu, B., Yan W., Shapiro, A.A., and Stenby, E.H. **Tertiary Carbon Dioxide Flooding of Low Permeable Chalk with In-Situ Saturation Determination using X-Ray Computed Tomography** (Poster presentation), International Symposium of the Society of Core Analysts held in Halifax, Nova Scotia, Canada, 4-7 October, 2010

Nordblad, Mathias; Xu, Yuan; Woodley, John. **Evaluation of reaction engineering parameters in enzyme based FAEE-biodiesel processes**. Presented at: AOCS Annual Meeting. Phoenix, AZ, USA, 16-19 May, 2010

Nordblad, Mathias; Xu, Yuan; Saaby Pedersen, Lars; Woodley, John. **Impact of reaction engineering parameters on process design for enzyme-based FAEE-biodiesel production**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 16-17 June, 2010

Nørskov, Linda; Larsen, Morten Boberg; Dam-Johansen, Kim; Glarborg, Peter; Jensen, Peter Arendt. **Alternative fuel combustion in cement rotary kilns**. Presented at: Dansk Kemiingeniør Konference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010, 163-164

Olsen, Dres Foged; Jørgensen, John Bagterp; Villadsen, John; Jørgensen, Sten Bay. **Modeling and Simulation of Single Cell Protein Production**. Presented at: 11th Computer Applications in Biotechnology, CAB 2010. Leuven, Belgium, 5-7 July, 2010

Olsen, Dres Foged; Jørgensen, John Bagterp; Villadsen, John; Jørgensen, Sten Bay. **Optimal Operating Points for SCP Production in the U-Loop Reactor**. Presented at: 9th International Symposium on Dynamics and Control of Process Systems, DYCOPS 2010. Leuven, Belgium, 7-9 July, 2010

Olsen, Dres Foged; Jørgensen, John Bagterp; Villadsen, John; Jørgensen, Sten Bay. **Single-Cell Protein Production in a U-Loop Reactor**. Presented at: Dansk Kemiingeniørkonference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010

Pathi, Sharat Kumar. **Attrition phenomenon in the fluidized bed calcination of limestones**. Presented at: Dansk Kemiingeniør Konference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010, 200

Petersen, Nanna; Stocks, Stuart M.; Eliasson Lantz, Anna; Gernaey, Krist. **Biomass Measurements in Filamentous Fermentations: Comparison of Advanced On-Line Sensors**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Petersen, Nanna; Stocks, Stuart; Eliasson Lantz, Anna; Gernaey, Krist. **Sammenligning af avancerede online sensorer til måling af biomassekoncentrationen i filamentøse fermenteringer**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010

Petersen N., Stocks S.M., Eliasson Lantz A. and Gernaey K.V. (2010) **Comparison of advanced online sensors for biomass measurements in filamentous fermentations**. 8th European Symposium on Biochemical Engineering (ESBES8), Bologna, Italy, September 5 - 8, 2010.

Prado Rubio, Oscar Andres; Jørgensen, Sten Bay; Jonsson, Gunnar Eigil. **Control System Development for Integrated Bioreactor and Membrane Separation Process**. Presented at: ESCAPE20. Ischia, Naples, Italy, 6-9 June, 2010

Prado Rubio, Oscar Andres; Jørgensen, John Bagterp; Jørgensen, Sten Bay. **Systematic Model Analysis for Single Cell Protein (SCP) Production in a U-Loop Reactor**. Presented at: ESCAPE20. Ischia, Naples, Italy, 6-9 June, 2010

Privat, Romain; Jaubert, Jean-Noel; Gani, Rafiqul. **Are Safe Results Obtained When the PC-SAFT Equation of State Is Applied to Ordinary Pure Chemicals?** Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Rasmussen, Martin Hagsted; Wedel, Stig; Illerup, Jytte Boll; Dam-Johansen, Kim; Nielsen, Hannibal; Pedersen, Kim Haugaard. **SO_2 Emission from Modern Cement Plants**. Presented at: Dansk Kemiingeniør Konference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010, 169-170

Roman Martinez, Alicia; Gani, Rafiqul; Woodley, John. **Implementation of Novel Integrated Pharmaceutical Processes: A Model-based Approach**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Roman Martinez, Alicia; Gani, Rafiqul; Woodley, John. **Model-based Design and Analysis of Integrated Biocatalytic Processes**. Presented at: CAPE Forum 2010. Aachen, Germany, 11-12 March, 2010

Roman Martinez, Alicia; Gani, Rafiqul; Woodley, John. **Model-based design and analysis of integrated biocatalytic processes**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 2010

Rype, Jens-Ulrik; Garde, Arvid; Jonsson, Gunnar Eigil. **Combining membrane separation technology and fermentation processes for improved performances**. Presented at: Dansk Kemiingeniørkonference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010

Sadegh, Negar. **Thermodynamic Modeling of Sour Gas Cleaning Process**. Presented at: 21st IUPAC International Conference on Chemical Thermodynamics. Tsukuba Science City, Ibaraki, Japan, 2010 Proceedings of the 21st IUPAC International Conference on Chemical Thermodynamics

Sadegh, Negar. **Thermodynamic Modeling of Sour Gas Cleaning Process**. (Invited speaker). Presented at: SPE Conference STC-2010. Germany, 2010 Proceedings from SPE Conference STC-2010

Sandersen, Sara Bülow. **Phase Equlibirum with Surfactant Model System at Elevated Pressures**. Presented at: Dansk Kemiingeniørkonference. Kgs. Lyngby, Denmark, 2010

Sansonetti, Sascha; Curcio, Stefano; Calabrò, Vincenza; Sin, Gürkan; Iorio, Gabriele. **Feasibility of the batch fermentation process of Ricotta Cheese Whey (RCW)**. Presented at: IBIC2010. Padua, Italy, 11-14 April, 2010

Schäpper D., Zainal Alam M.N.H., Bolic A., Eliasson Lantz A. and Gernaey K.V. (2010) **Microbioreactors for bioprocess development – practical aspects and limitations**. International Conference on Implementation of Microreactor Technology into Biotechnology (IMTB 2010), Ljubljana, Slovenia, September 29-30, 2010.

Shafique Bashir, Muhammad; Jensen, Peter Arendt; Frandsen, Flemming; Wedel, Stig; Dam-Johansen, Kim; Pedersen, Søren T; Wadenbäck, Johan. **Ash Deposition and Shedding in Biomass Suspension Fired Boilers: Full Scale Experimental Study**. Presented at: Dansk Kemiingeniør Konference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010, 176-177

Sin, Gürkan; Eliasson Lantz, Anna; Gernaey, Krist. **Perspectives on the use of global uncertainty and sensitivity analysis methods in a PAT context**. Presented at: 24th International Foundation Process Analytical Chemistry (IFPAC). Baltimore, Maryland, USA, 31 January - 4 February, 2010

Sin, Gürkan; Ruano, M.V.; Neumann, Marc B.; Ribes, J.; Gernaey, Krist; Ferrer, J.; Loosdrecht, Mark C.M. van; Gujer, Willi. **Sensitivity analysis in the WWTP modelling community – new opportunities and applications**. Presented at: 2nd IWA/WEF Wastewater Treatment Modelling Seminar. Mont-Sainte-Anne, Quebec, Canada. March 26-31, 2010

Sin, Gürkan. **Sensitivity and uncertainty analysis: Expanding engineering toolbox for science-based decision making**. Presented at: Invited Seminar, Kongsberg Oil and Gas Technology. Sandvika, Norway, 24 September, 2010

Sin, Gürkan. **Uncertainty in modelling, design and operation of chemical processes**. Presented at: Dansk Kemiingeniørkonference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010

Singh, Ravendra; Gernaey, Krist; Gani, Rafiqul; Woodley, John. **An Ontological Knowledge-Based System for Identification of Efficient Chemical Production Routes**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Singh, Ravendra; Abdul Samad, Noor Asma Fazli; Gernaey, Krist; Woodley, John; Gani, Rafiqul. **Mechanistic modeling for systematic design and analysis of PAT systems (Invited Lecture)**. Presented at: 24th International Foundation Process Analytical Chemistry (IFPAC). Baltimore, Maryland, USA, 31 January - 4 February, 2010

Singh, Ravendra. **Model-based computer-aided framework for design of process monitoring and analysis systems (PAT systems) (Invited Lecture + PhD Thesis Award)**. Presented at: ESCAPE20, Ischia, Naples, Italy, 6-9 June, 2010

Singh, Ravendra; Gernaey, Krist; Gani, Rafiqul. **Systematic computer-aided method and tool (ICAS-PAT) for design, analysis &/or validation of process monitoring and analysis systems (PAT systems)**. Presented at: CHISA2010/ECCE-7. Prague, Czech Republic, 28 August – 1 September, 2010

Singh, Ravendra; Gernaey, Krist; Gani, Rafiqul; Woodley, John. **Systematic Framework for Design and Adaption of Fast, Flexible, Continuous Modular Plants**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

Singh, Ravendra; Abdul Samad, Noor Asma Fazli; Sin, Gürkan; Gernaey, Krist; Gani, Rafiqul. **Systematic method and tool for design, analysis &/or validation of PAT systems**. Presented at: APACT-10. Manchester, UK, 28-30 April, 2010

PUBLICATIONS CONTINUED

Sprouse, George; McCormick, Jeff; Schraa, Olivier; Sin, Gürkan. **IWA Design and Operational Uncertainty Task Group: Document and evaluate existing methods for assessing and evaluating uncertainty in wastewater treatment**. Presented at: IWA World water congress and exhibition. Montreal, Canada, 19-24 September, 2010

Tansutapanich, P.; Malakul, P.; Gani, Rafiqul. **Sustainable process design for lignocellulosic-based bioethanol using life cycle assessment technique**. Presented at: 2nd International Symposium on Sustainable Chemical Product and Process Engineering. Hangzhou, China, 9-12 May, 2010

Telschow, Samira; Frandsen, Flemming; Wedel, Stig; Dam-Johansen, Kim; Theisen, Kirsten. **Investigation of industrial Portland cement clinker formation and improvement of the burning technology**. Presented at: Dansk Kemiingeniør Konference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010, 196-197

Thomsen, Kaj. **CAP Chemistry and Phase Equilibrium in the CO_2-NH_3-H_2O System**. (invited speaker) Presented at: CAP Workshop. Admini - Porsgrunn (Herøya), Norway, 2010

Thomsen, Kaj. **Comparison CAP vs. MEA/ amine**. (Invited speaker). Presented at: CAP Workshop. Admini - Porsgrunn (Herøya), Norway, 2010

Thomsen, Kaj. **Recovery of Phosphate from Waste: Thermodynamic Modeling of Phosphate Systems**. Presented at: PPEPPD. Suzhou, China, 2010

Tindal, Stuart; Xue, R.; Archer, I.V.J.; Carr, R.; Farid, S.; Hailes, H.C.; Woodley, John. **Enzymatic Bioprocess Considerations when Changing Substrate**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 16-17 June, 2010

Tindal, Stuart; Farid, S.; Hailes, H.C.; Carr, R.; Archer, I.; Woodley, John. **Process Technology for the Application of D-Amino Acid Oxidases in Pharmacutical Intermediate Manufacturing**. Presented at: Scale-up of Chemical Processes. Edinburgh, UK, 16-19 May, 2010

Tsivintzelis, Ioannis; Beier, M.J.; Grunwaldt, J.D.; Kontogeorgis, Georgios. **Modeling the Phase Behavior of Mixtures used in Oxidation of Alcohols in Supercritical CO_2**. Presented at: the 12th International Conference on Properties and Phase Equilibria for Product and Process Design. Suzhou, China, 2010 Proceedings from the 12th International Conference on Properties and Phase Equilibria for Product and Process Design - digital edition

Tsivintzelis, Ioannis; Kontogeorgis, Georgios; Michelsen, Michael Locht; Stenby, Erling Halfdan. **Recent Applications of the CPA Equations of State**. Presented at: SAFT2010. Barcelona, Spain, 2010

Vangsgaard, Anna Katrine; Sin, Gürkan; Gernaey, Krist; Smets, Barth F.. **Validation of Structured Model of Complete Autotrophic Nitrogen Removal**. Presented at: Research center EcoDesign-MBR meeting. Aalborg, Denmark, 5 November, 2010

Vennestrøm, Peter Nicolai Ravnborg; Pedersen, Sven; Christensen, Claus H.; Grunwaldt, Jan-Dierk; Woodley, John. **Combining enzymes with heterogeneous chemical catalysts**. Presented at: Nordic Symposium on Catalysis. Marienlyst, Denmark, 29-31 August, 2010

Vennestrøm, Peter Nicolai Ravnborg; Pedersen, Sven; Christensen, Claus H.; Grunwaldt, Jan-Dierk; Woodley, John. **Combining enzymes with heterogeneous chemical catalysts: chemoenzymatic combination of oxidase enzymes with titanium silicalite-1**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 16-17 June, 2010

Von Solms, N: Woodley, John M; Johnsson, Jan-Erik; Abildskov, Jens. **Integrating chemical engineering fundamentals in the capstone process design project.** Presented at CDIO conference, Montreal, Canada, 15-18 June, 2010.

Voss, Bodil; Grunwaldt, Jan-Dierk; Woodley, John; Andersen, Simon Ivar. **Chemicals from Biomass: Sustainability and Feasibility of a Cu-based Catalyst**. Presented at: Dansk Kemiingeniørkonference - DK2-2010. Lyngby, Denmark, 16-17 June, 2010

Völcker, Carsten; Jørgensen, John Bagterp; Thomsen, Per Grove; Stenby, Erling Halfdan. **Production Optimization for Two-Phase Flow in an Oil Reservoir**. Presented at: 16th Nordic Process Control Workshop. Lund, Sweden, 2010

Wagner, Jakob Birkedal; Grunwaldt, Jan-Dierk; Hansen, Thomas Willum; Dunin-Borkowski, Rafal E.. **In situ TEM studies of supported palladium catalysts for the oxidation of methane**. Presented at: MRS Fall Meeting, 2010

Wagner, Jakob Birkedal; Grunwaldt, Jan-Dierk; Hansen, Thomas Willum; Beleggia, Marco; Boothroyd, Chris; Dunin-Borkowski, Rafal E.. **Probing Catalysts Under Working Conditions using Environmental Transmission Electron Microscopy**. Presented at: Titan User Club meeting, 2010

Wedberg, Rasmus; O*Connell, John P.; Peters, Günther H.J.; Abildskov, Jens. **Fluctuation solution properties from molecular simulations**. Presented at: 12th International Conference on Properties and Phase Equilibria for Product and Process Design. Suzhou, Jiangsu, China, 2010

Wedberg, Rasmus; Peters, Günther H.J.; Abildskov, Jens. **Studying Candida Antarctica Lipase B in Organic Solvents at Fixed**

Water Activities using Molecular Dynamics Simulations. Presented at: IBBI 2010 (Isolated biomolecules and biomolecular interactions). Berlin, Germany, 2010

Woodley, John; Gernaey, Krist; Tufvesson, Pär. **Biocatalytic process technology**. Presented at: CBCS. Graz, Austria, 18-19 March, 2010

Woodley, John; Andrade Santacoloma, Paloma de Gracia; Vennestrøm, Peter Nicolai Ravnborg; Sin, Gürkan; Gernaey, Krist. **Concepts in multi-step biocatalysis**. Presented at: Zing Biocatalysis conference. Puerto Morelos, Mexico, 10-13 December, 2010

Xu, Yuan; Nordblad, Mathias; Woodley, John. **Development of reactor technology for improved catalytic productivity in enzymatic FAEE-biodiesel production**. Presented at: AOCS Annual Meeting. Phoenix, AZ, USA, 16-19 May, 2010

Yan, Wei; Stenby, Erling Halfdan. **PVT Modeling of Reservoir Fluids using PC-SAFT EoS and Soave-BWR EOS**. Presented at: 12th International Conference on Properties and Phase Equilibria for Product and Process Design. Suzhou, China, 2010

Yu, Kaijia; Marin, Jose Manuel Roman; Jensen, Mette Krog; Rasmussen, Henrik K.; Hassager, Ole. **Extension of cylindrical samples in the Sentmanat Extensional Rheometer (SER)**. Presented at: AERC 2010. Göteborg, Sweden, 2010

Yu, Kaijia; Marin, Jose; Jensen, Mette; Rasmussen, Henrik K.; Hassager, Ole. **Modeling of dual cylinder wind-up extensional rheometers**. Presented at: The Society of Rheology 82nd Annual Meeting. Santa Fe, New Mexico, 2010, CR19

Yuan, Hao; Shapiro, Alexander; Stenby, Erling Halfdan. **Transport of reservoir fines: a novel model for formation heterogeneity and particle heterogeneity**. Presented at: Center for Energy Resources Engineering Discussion Meeting 2010. LO-skolens konferencecenter, Gl. Hellebækvej 70, DK-3000 Helsingør, 2010

Yuan, Linfeng; Jonsson, Gunnar Eigil; Woodley, John; Korsholm, Lars. **Electro-membrane filtration for amino acid separation**. Presented at: Dansk Kemiingeniørkonference. Lyngby, Denmark, 16-17 June, 2010

Yuan, Linfeng; Korsholm, L.; Jakobsen, S.; Woodley, John; Jonsson, Gunnar Eigil. **Electro-membrane filtration for amino acid separation**. Presented at: ACS National Meeting. San Francisco, California, USA, 21-25 March, 2010

Yuan, Linfeng; Korsholm, L.; Jakobsen, S.; Woodley, John; Jonsson, Gunnar Eigil. **Separation of amino acids by electro-membrane filtration**. Presented at: AMS 6 / IMSTEC 10. Sydney, Australia, 22-26 November, 2010

Zahid, Adeel; Stenby, Erling Halfdan; Shapiro, Alexander. **Advanced Waterflooding in Carbonate Reservoirs**. Presented at: 11th International Symposium on Evaluation of Wettability and Its Effect on Oil Recovery. University of Calgary, Alberta, Canada, 2010

Zainal Alam M.N.H., Meyer A., Jonsson G. and Gernaey K.V. (2010) **Continuous membrane microbioreactor for integrated pectin degradation and separation**. Presented at: 11th International Conference on Microreaction Technology (IMRET-11), Kyoto, Japan, March 8-11, 2010.

Zainal Alam M.Z.H., Pinelo M., Meyer A.S., Jonnsson G. and Gernaey K.V. (2010). **Membrane microbioreactor prototype for enzyme-catalyzed degradation of pectin**. Presented at 8th European Symposium on Biochemical Engineering (ESBES8), Bologna, Italy, September 5 - 8, 2010.

Zainal Alam, Muhd Nazrul Hisham; Pinelo, Manuel; Meyer, Anne S.; Jonsson, Gunnar Eigil; Gernaey, Krist. **Membrane Microbioreactor for Enzyme-Catalyzed Degradation of Pectin**. Presented at: AIChE Annual Meeting. Salt Lake City, Utah, USA, 7-12 November, 2010

MASTER'S AND BACHELOR COURSES

The department participates in a 3½ year education for the Bachelor of Engineering, a 3 year education for Bachelor of Science and a 2 year education for the Master of Science degree. Below, course numbers and names are shown for 2010 with the number of students attending shown in brackets. Courses for the Bachelor of Engineering are marked with (**B**). The other courses are Master's courses or common courses.

SPRING-SEMESTER

28001 Introduction to Chemistry and Chemical Engineering (54)
28012 Chemical and Biochemical Process Engineering (12) (**B**)
28016 Mathematical models for Chemical and Biochemical Systems (25) (**B**)
28017 Chemical and Biochemical Process Engineering (7) (**B**)
28020 Introduction to Chemical and Biochemical Engineering (43)
28022 Unit Operations of Chemical Engineering and Biotechnology (27) (**B**)
28121 Chemical Unit Operations Laboratory (10)
28122 Chemical Unit Operations Laboratory – Summer University for Europeen (21)
28157 Process Design (27) (**B**)
28160 Mathematical Models for Chemical Systems (30)
28212 Polymer Chemistry (13)
28221 Chemical Engineering Thermodynamics (16)
28231 Laboratory in Chemical and Biochemical Engineering (22)
28241 Chemical Kinetics and Catalysis (17)
28322 Chemical Engineering Thermodynamics (31) (**B**)
28342 Chemical Reaction Engineering (19) (**B**)
28345 Biochemical Reaction Engineering (29)
28350 Process Design: Principles and Methods (65)
28352 Chemical Process Control (28) (**B**)
28415 Oil and Gas Production (17)
28423 Phase Equilibria for Separation Processes (12)
28434 Membrane Technology (27)
28443 Industrial Reaction Engineering (38)
28451 Optimizing Plantwide Control (14)
28852 Risk Assessment in Chemical Industry (37)
28855 Good Manufactoring Practice (53)
28863 Introduction to Fortran Programming (2)
28864 Introduction to Matlab Programming (19)
28885 Technology and Economy of Oil and Gas Production (15) (**B**)

Courses given in co-operation with other departments:

26010 Introductory Project in Chemistry (1)
26316 Analysis and Chromatography (40)
27944 Biotechnology and Process Design (21) (**B**)
31525 Physiological Transport Phenomena (8)
41683 Materials Science (20) (**B**)

MASTER'S AND BACHELOR COURSES

FALL-SEMESTER

28012 Chemical and Biochemical Process Engineering (37) (**B**)
28016 Mathematical models for Chemical and Biochemical Systems (19) (**B**)
28022 Unit Operations of Chemical Engineering and Biotechnology (25) (**B**)
28121 Chemical Unit Operations Laboratory (13)
28140 Introduction to Chemical Reaction Engineering (20)
28150 Introduction to Process Control (36)
28156 Process and Product Design (19) (**B**)
28213 Polymer Technology (17)
28233 Recovery and Purification of Biological Products (16)
28244 Combustion and High Temperature Process (37)
28246 Applied Enzyme Technology and Kinetics (28)
28247 Advanced Enzyme Technology (14)
28310 Chemical and Biochemical Product Design (42)
28315 Colloid and Surface Chemistry (22)
28322 Chemical Engineering Thermodynamics (21) (**B**)
28342 Chemical Reaction Engineering (30) (**B**)
28352 Chemical Process Control (21) (**B**)
28361 Chemical Engineering Model Analysis (24)
28420 Separation Processes (21)
28515 Enhanced Oil Recovery (13)
28530 Transport Processes (38)
28811 Polymers in Processes and Products (11)
28845 Chemical Reaction Engineering Laboratory (17)
28851 Chemical Plant Operation (15)
28864 Introduction to Matlab Programming (26)

Courses given in co-operation with other departments:

10336 Fundamentals Problems in Fluid Dynamics (5)
12411 Introduction to Petroleum Technology (19)
23522 Rheology of Food and Biological Materials (10)
26010 Introductory Project in Chemistry (42)
27004 Health, Diseases and Technology (43)
27103 Development and Research (3)
27944 Biotechnology and Process Design (23) (**B**)
41657 Materials Science for Chemists (27)
41683 Materials Science (17) (**B**)

MASTER OF SCIENCE DEGREES

38 students finished their research projects for the MSc. Degree. The project titles and names of the students are listed below:

Albo, Erez
Pilot Scale Validation of a Viscous Fermentation Model in view of Supporting Decision-making for up/down Scaling

Aranda Luque, Verónica
High-pressure Oxidation of Alcohols

Berg, Camilla
Thermodynamic Modeling of Extra Heavy Oil

Bialas, Dawid Jan
Model Predicitve Control for Reactor-separator-recycle Systems

Caviedes Nozal, Alba
Extraction and Crystallization of Nutritional Salts from Biomass Fly Ash

Charnalia, Nathalie Devi
Intensification of Fluid Bed Salt Coating Processes

Chasco Aristimuño, Javier and Pereda Mateo, Ignacio
Contineous Production of Pharmaceuticals

Christensen, Jon Rune
Carbonate Looping CO_2 Reduction

Eecloo, Jonas
A Dynamic Model for Cellulosic Biomass Hydrolysis: Validation of Enzyme Adsorption and Enzyme Stability/decay Mechanisms

Ferrer Roca, Carme
Evaluation of Novel Molecular Strategies for Improved Membrane Separation Processes

França, Ana Sofia
Flash Pyrolyse of Waste

Frost, Michael
Measurement and Modelling of Phase Equilibrium of Oil-MEG-water Mixtures

Gómez Baraibar, Àlvaro
Characterization of Transamination Reactions for Biocatalytical Chiral Amine Synthesis

Gómez Navascués, Leyre
NO_x Formation in Oxyfuel-combustion

Jensen, Kim Bo
Combustion of Alternative Fuels

Jensen, Susanne Langgaard
Enzymatic Extraction of Sugar Beet Pectin

Jiang, Yan
The Influence of Relative Permeability Hysteresis on CO_2 WAG Simulation

Jørgensen, Lars
Study of the Formation of Clinker Porosity

Kaltsouni, Vasiliki
Distribution of Chemicals in Oil-water Systems

Knage-Rasmussen, Anders Møllegaard
Measurement and Modelling of Hydrocarbon Dew Points for Synthetic and Real Natural Gases

Kuusela, Johanna
Measurement and Modeling of Industrial Relevant Properties of CO_2 Capture Solvents

Liu, Sijing
Modelling and Optimization of Integrated Bioreactor and Membrane Separation Process

Maribo-Mogensen, Bjørn
Oxyfuel Combustion of Coal and Biomass for Below Zero CO_2 Emission

Mattei, Michele
Computer Aided Chemical Product Design

Mortensen, Peter Mølgaard
Reactions and Kinetics of Adiabatic Pre Reforming

Nekiunaite, Laura
Evaluation of Xylanase Catalysed Viscosity Reduction in a Microscale Robotic System

Nilsson, Julie Mahler
Enzymatic Viscosity Decrease of Manure as a Decision Base for Biogas Business Development

EDUCATION CONTINUED

MASTER OF SCIENCE DEGREES

Pedersen, Roelof Bjarke
Relative Permeability Study for Carbon Dioxide WAG

Rodriguez Cantu, Rogelio
Sulfur Chemistry in Oxyfuel Combustion

Rørstrøm, Tim
Modelling of Aromatic Acids with the CPA Equation of State

Sørensen, Daniel Steen Haase
Studies of the Influence of Enzymes on the Physical Properties of Crude Oils

Trane, Rasmus
Study of Dewaxing Catalysts

Vangroenweghe, Stef
A Dynamic Model for Cellulosic Biomass Hydrolysis: Validation of enzyme Adsorption and Enzyme Stability/decay Mechanisms

Vennestrøm, Peter Nicolai Ravnborg
Heterogeneous Chemoenzymatic Combinations for Bulk Chemical Production

Wilbek, Fie Alice Hallkvist
Development of a Kinetic Model for the MTG Process

Yassine, Ahamd Ibrahim
Development of a Screening Tool for Heavy Oil Prospects

Zeuner, Birgitte
Optimizing the Recovery of RG-II from Sugar Beet Pectin by Using Membrane Reactor

BACHELOR DEGREES

25 students finished their research program for the B.Sc. Degree. The project titles and names of the students are listed below:

Abdil Hadi, Faten Nafe
Measurement and Thermodynamic Modelling of Aqueous Acetic Acid Alkali Acetate Systems

Alamili, Ahmad
Kinetic Modelling of Two-enzyme Reactions

Alamood, Hanaa Naji Abdulrazaq
CO_2 Absorption Using Amino Acid Salt Solutions

Al-Ward, Ater Baker and Ibrahim, Hulouvan Kamal
Waste Water treatment using Membrane Bioreactor (MBR)

Derawi, Bilal
Thermodynamic Modeling of Systems Containing Ammonium Ions

Dudus, Senol and Paarup, Lars
Steam Reforming Kinetics on a Fuel cell Anode catalyst

Engelbrechtsen, Mette and Jespersen, Jacob Boll
Mass Transfer in Single Pellet String Reactors

Ghani, Ahmad Hussein
Removal of CO_2 from Flue Gas using Amino Acid Salt Solutions

Grossmann, Jesper Banke
Kinetics for Char Oxidations by O_2 and CO_2

Heltborg, Carsten Kirstejn
The Influence of Small Particles on the Operation of a Wet Flue Gas Desulphurisation Plant

Jørgensen, Ingeborg Piil Habekost
Influence of Crystal Seeds on Clinker Formations

Kocak, Solmas
Inhibition of Gas Hydrates with Kinetic Inhibitors

Larsen, Morten Loll
Measurement and Modelling of Heat Transfer in a Fluid Bed

Larsen, Tina Krohn
The Biobooster as an Enzymatic Reactor System

Larvad, Niels Alexander
Solvent Selection for Biocatalysis

Lykkestrup, Merete
Design of Enzymatic Reactions in the Biobooster Reactor System

Meyland, Lene Have
Investigation of the Promoting/inhibiting Effect of Different Kind of Salts Upon the Reaction CaO/SO_2

Muse, Mohamud Abdi
Experimental Determination of pH Correction Term for Concentrated Solutions

Pedersen, Anders Kristian and Rønnest, Andreas Klinge
Investigation of Forces Fields of Organic Compounds

Pedersen, Mikkel Gielsager
Measurement and Modeling of the Properties of Solvents for Carbon Capture

Petersen, Morten Storgaard
Kinetics for Char Oxidation by O_2 and CO_2

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ADVISORY BOARD

LARS BANG

EXECUTIVE VICE PRESIDENT · H. LUNDBECK A/S

Scientific research at university level is a prerequisite for the development of Lundbeck's chemical activities in Denmark. We have had a beneficial cooperation with KT for several years, collaborating on PhD projects and recruiting several of its candidates. Furthermore, it has been a great advantage to be able to draw on the knowledge of KT's scientific staff as advisors/consultants.

KIM PANDRUP CHRISTENSEN

DIRECTOR OF TECHNOLOGY · ANDRITZ FEED & BIOFUEL A/S

The close cooperation with DTU Chemical Engineering will ensure significant results within the biofuel technology which will benefit a lot of industries. Long-term focus on development and innovation is necessary to meet the ever changing opportunities, rules and legislation that most industries will have to comply with. DTU Chemical Engineering ensures a high level of education and important research projects that will lead to technologies of the future.

BJERNE CLAUSEN

DIRECTOR OF RESEARCH & DEVELOPMENT · HALDOR TOPSØE A/S

Working closely with the best research groups within the fields of our core competences is of major importance to Haldor Topsoe A/S. Our cooperation with KT enables us to resolve research challenges beyond our competences and resources and is an important source of inspiration and knowledge for employees at Haldor Topsoe, benefiting their own and the company's development.

PER FALHOLT

EXECUTIVE VICE PRESIDENT · NOVOZYMES A/S

In terms of industrial collaboration DTU Chemical Engineering is at the front-line and our cooperation is exemplary. For Novozymes it is very important that possible future technologies are developed and tested within a university framework where new valuable employees get their education and where real solutions to major challenges to society are found. KT fully answers these demands, benefiting both society and Novozymes.

ALLAN SKOV

VICE PRESIDENT · CHEMINOVA A/S

Excellence in education and research is a precondition for Danish industry to stay competitive in the harsh environment of international business today. KT's contributions in these fields are important for society in general and instrumental for the continuing development of Cheminova.

STUDENT COMMITTEE

Student Committee members: Kasper Linde (left), Asbjørn Toftgaard Pedersen (top), Deenesh Kavi Babi (right), Lene Svendsen (bottom left), Alexander Rubin (bottom right) and Thomas Petersen (center).

KTStudents is the student organization at DTU Chemical Engineering. The purpose of the organization is to create opportunities and great experiences for the students at the department. We do this through industry events, social gatherings, and KTStudent involvement within the department. We give the students an opportunity to network with other students interested in chemical engineering.

Thomas Petersen, President, KTStudents

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DEPARTMENTAL SEMINARS AT DTU CHEMICAL ENGINEERING IN 2010

FEBRUARY 25

Professor Kyle V. Camarda, The University of Kansas, USA:

"Applications of Computational Molecular Design."

MARCH 17

Dr. Kim grøn Knudsen, Haldor Topsøe A/S:

"Case stories from Haldor Topsøe: Novel hydrotreating technology for production of green diesel, a better understanding of the individual component classes of diesel and new developments in DeNOx."

APRIL 22

Dr. Guggi Kofoed, University of Potsdam, Germany:

"Soft capacitors for "artificial muscles" – polymer materials with large electromechanical motion."

MAY 26

Professor Martin Grunow, DTU Management, Denmark:

"Supply Chain Management in the Process Industries."

JUNE 10

Professor Gabrielle Sadowski, University of Dortmund, Germany:

"Thermodynamic Modeling of Biorelevant Systems."

SEPTEMBER 16

Professor João Coutinho, Aveiro University, Portugal:

"Modeling Phase Equilibria in Biodiesel Production Using CPA."

OCTOBER 28

Professor Lourdes F. Vega, Carburos, Spain:

"The challenge of capturing and utilizing CO_2."

NOVEMBER 4

Dr. Hermann J. Feise, BASF SE, Germany:

"Particle Technology R&D in the Chemical Industry."

USEFUL INFORMATION

Guide to the department

- Department of Chemical and Biochemical Engineering
- Administration, offices, DTU cafeterias, Student House
- Departments/centers
- Auditoriums
- Oticon Hall
- Halls of residence/shared facilities
- SCION.DTU
- Physical Plant
- Parking
- Bus stop

This Annual Report 2010 may be ordered
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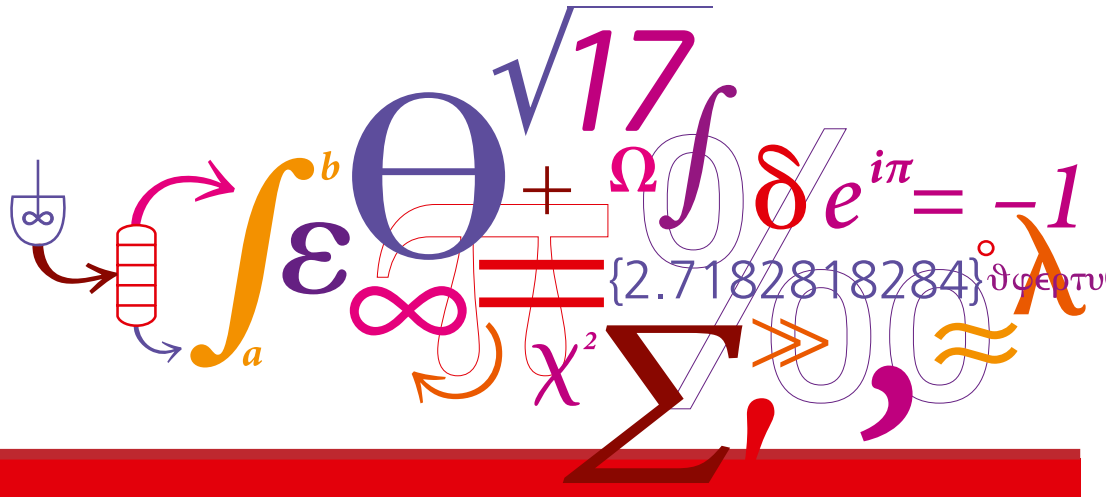
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