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Finnish Catalysis Society

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Arvoisa Katalyysiseuran jäsen!
Dear member of Catalysis Society!

The conference season of this fall is ending. Many members of our society have attended e.g. EUROPACAT conference in Kazan, Russia or EUROPACAT satellite conference Catalysis for Renewable Sources in Catania, Sicily. The scientific program of both conferences was obviously of high level. However, the number of participants in both conferences was probably a disappointment. Especially, only 850 participants in Kazan being approximately a half of the standard number of participant is definitely below the targets of organizers. Obviously, the political situation was the most significant reason limiting the participation. Next time EUROPACAT will be organized in Florence, Italy in 2017 and I guess that at least the place of the conference might attract many scientists. Furthermore, I would like to remind you that 16th International Congress on Catalysis (ICC 16) will be organized in July, 2016 in Bejing, China.

Instead of annual seminars, Finnish Catalysis Society will launch a new annual event called Finnish Young Scientist Forum on Catalysis. I this way, We would like gather Finnish catalysis community once a year. Model has been taken from corresponding event in Netherlands. All PhD students working in the field of catalysis in Finland and their supervisors will be invited to the event. Students will give short oral presentations regarding their research. Furthermore, guest lecturers will be invited from Finnish chemical industry. The responsibility to organize the Forum will circulate between Finnish university groups being active in the field of catalysis. The first organizer of the event will be Industrial Chemistry and Reaction Engineering group of Åbo Akademi and the Forum will be organized on Friday 8th April, 2016 in Tampere.

In parallel with the Forum, our goal is to encourage all PhD students in the field of catalysis to apply membership in Finnish Catalysis Society. However, most of the new PhD students in this field are originating nowadays outside Finland. Therefore, most of the information by the Society will be provided in future in English including this Chairman's Column. We warmly welcome all new members independent of your origin!

Juha Lehtonen
puheenjohtaja
Chairman

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Suomen katalyysiseuran neljäs väitöskirjapalkinto

Hakuaika 1.12.2015-15.1.2016

Suomen Katalyysiseura julistaa haettavaksi väitöskirjapalkinnon, joka annetaan suomalaisessa yliopistossa tai tutkimuslaitoksessa hyväksytystä innovatiivisesta ja tieteellisesti korkeatasoisesta väitöskirjasta. Väitöskirjapalkinnon tarkoituksena on edistää suomalaisen katalyysitutkimuksen näkyvyyttä ja tunnettuutta. Palkinto kattaa kaikki katalyysin osa-alueet: heterogeenisen, homogeenisen ja biokatalyysin. Palkinnon suuruus on 2000 euroa.

Väitöskirjapalkinto myönnetään joka kolmas vuosi, ensimmäisen kerran palkinto jaettiin vuonna 2007 (David Kubicka, ÅA), toisen kerran 2010 (Pasi Virtanen, ÅA) sekä kolmannen kerran 2013 (Viljami Pore, HU). Väitöskirjan tulee olla valmistunut hakuaikaa edeltävän kolmen vuoden aikana (1.1.2013–31.12.2015), ja sen on oltava väitöstilaisuudessa hyväksytty viimeistään 31.12.2015.

Väitöspalkintoa myönnettäessä huomioidaan seuraavat seikat: väitöskirjan tieteellinen taso ja arvosana, tutkimustyön uutuusarvo, sekä tutkimusaiheen ajankohtaisuus. Erityisesti halutaan suosia töitä, joiden tulokset on julkaistu tai hyväksytty julkaistavaksi korkeatasoisissa kansainvälisissä julkaisusarjoissa. Työ voi olla perus- tai soveltavaa tutkimusta. Palkinnon saaja voi olla suomalaisessa yliopistossa tai korkeakoulussa väitellyt suomalainen tai ulkomaalainen tutkija. Palkinnon saajalla ei ole ikärajaa.

Palkintoehdotuksia voivat tehdä yksittäiset tutkijat tai tutkimusyhteisöt, ei kuitenkaan väitöstyön tekijä itse. Ehdotukseen tulee liittää väitöskirja, sekä vastaväittäjien ja ennakkotarkastajien lausunnot. Palkintoehdotukset osoitetaan Suomen Katalyysiseuralle. Seuran hallitus suorittaa alkukarsinnan ja valitsee parhaat työt finaaliin lähetettäväksi yhdelle ulkopuoliselle asiantuntijalle, joka valitsee palkinnon saajan. Seuran hallitus nimeää ko. asiantuntijan, joka ei ole suomalaisen tiedeyhteisön jäsen. Finaaliin päässeille väitöskirjoille annetaan kunniamaininta.

Palkintoehdotukset voi toimittaa osoitteeseen:

Suomen Katalyysiseuran pj
Prof. Juha Lehtonen
Aalto yliopisto
PL 16100
00076 Aalto
s-posti: juha.lehtonen@aalto.fi

The fourth Doctoral thesis award of the Finnish Catalysis Society

Application period December 1st, 2015 – January 15th, 2016

The Finnish Catalysis Society invites nominations for the Best Doctoral Thesis Award, which is given to an innovative and high quality Doctoral Thesis accepted in a Finnish university or research institute. The purpose of the award is to increase the visibility of the Finnish catalysis research. The award covers all aspects of catalysis: heterogeneous, homogeneous and biocatalysis. The award is worth 2000 €.

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The award is given every third year and was given for the first time in 2007 (David Kubicka, ÅA), second time 2010 (Pasi Virtanen, ÅA), and third time 2013 (Viljami Pore, HU). The nominated theses must have been finalized during the three years preceding the application period (between January 1, 2013 and December 31, 2015) and they must have been accepted in a thesis defense no later than December 31, 2015.

The following points will be considered when choosing the winner: scientific quality and mark of the thesis, novelty of the research and topicality of the research area. Especially those works, which have results that have been published or have been accepted for publication in high-quality international journals, will be favored. The work can be of fundamental or of applied nature. The receiver of the award can be Finnish or foreign researcher who has defended his/her doctoral thesis in a Finnish University. There is no age limit for the award receiver.

Candidates for the award may be nominated by individual researchers or by research groups, but not by the candidate him/herself. The suggestion must include the doctoral thesis and statements by the opponent and the pre-examiners. The nominations are addressed to the Finnish Catalysis Society. The board of the Society will make a preliminary selection and choose the final candidates to be sent to an external expert who will choose the winner of the award. The board of the Society will nominate this expert who is not a member of the Finnish science community. An honorable mention will be given to all theses that have reached the final.

Suggestions for the receiver of the award can be sent to:

Chairman of the Board of the Finnish Catalysis Society
Prof. Juha Lehtonen
Aalto University
P.O.Box 16100
00076 Aalto
e-mail: juha.lehtonen@aalto.fi

1st Finnish Young Scientist Forum on Catalysis on 8th of April, 2016

Finnish Catalysis Society organizes the first ever Finnish Young Scientist Forum on Catalysis on 8th of April, 2016, in Tampere in connection with the annual meeting of the Finnish Catalysis Society.

The aim of the Young Scientist Forum is to bring together the top experts working in the field of catalysis not only from the academia but also from industry. In the one-day event, doctoral students and companies are invited to present their research in oral talks, and engage in lively discussion. In addition, the winner of the fourth Doctoral thesis award of the Finnish Catalysis Society will give a lecture in the event. Set the date in your calendars and stay tuned for further information.

News from EFCATS council meeting, 30.8.2015, Kazan, Russia

The main topics in this meeting were to continue the renewal of the legal structure of EFCATS, website and inform about the awards. In addition, information about arrangements of EuropaCatXII in Kazan were given by prof. V.I. Bukhtiyarov as well as

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from the plans to arrange next EuropaCat in Florence in 2017.

The total number of participants in EuropaCatXII in Kazan was 840 people, out of which about half were from Russia. In addition, about 150 students participated in the conference. The conference succeeded very well and the programme consisted of four parallel sessions as well as separate sessions in selective oxidation and in education in the field of catalysis. Several discussion symposia were included in the programme giving the possibility for young scientists to present their posters as flash oral presentations. In addition, 12 student awards were given in the conference.

EFCATS gave five awards in catalysis. Young scientist award was granted to professor Xile Hu at Ecole Polytechnique Fédérale de Lausa. This prize was sponsored by BASF. The award in applied catalysis sponsored by BP was given to professor emeritus Iacovos Vasalos in Aristotle University in Thessaloniki. In addition the award of the best doctoral thesis was given to Klaas Jan Schouten from Leiden University. The Francois Gault Lectureship was given to professor Joachim Sauer at the Humboldt-Universität in Berlin and the Boudart award of catalysis sponsored by Haldor Topsoe company to Hajo Freund of Fritz Haber Institute. The biographies of the awardees can be seen in EFCATS webpage.

Professor G. Centi presented the plans for organizing EuropaCatXIII in Florence in August 2017. Especially the start of the conference on Sunday 27.8 with lectures was discussed intensively. The idea was to decrease the budget and shorten the conference so that it would end on Thursday 31.8.

EFCATS will support the organization of Catalysis School in 2016. Dr. F. Quignard from France presented plans, how they would organize the catalysis school. This event was, however, already arranged for the first time in France in 2014, and thus it was discussed about the possibility, whether the school could be arranged somewhere else. It was decided that the time for sending proposals as a form of bid to arrange EFCATS catalysis schools iss prolonged until 15.12.2015.

EFCATS should try to get several member countries to be involved in its work. Such countries, from which there are no representatives in catalysis include for example Baltic countries and Ukraine. It was decided that EFCATS council or some national societies from other countries can take this initiative and ask the willingness from the representatives from these countries to participate in EFCATS activities.

A new EFCATS board was selected. Professor J. Lercher will continue as the president and prof. B. Weckhuisen as the treasurer. Prof. Justin Hargreaves will be acting as the secretary and professor G. Centi as the vice president. Professor A. Lemonidou was selected to a new board member. The next EFCATS council meeting will be arranged on 7th of March and the place will be informed later on.

Dr. Päivi Mäki-Arvela

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Berzelius-palkinto 2014/ Berzelius prize 2014

Dr. Karoliina Honkala from Department of Chemistry, University of Jyväskylä, has been honored with the Berzelius prize in 2014. She is invited to give a plenary lecture in the next Nordic Symposium on Catalysis, Lund, 14-16th of June, 2016.

The Berzelius prize is awarded to a person coming from a member country of the Nordic Catalysis Society, and it is given based on the scientific merits evaluated by a separate committee. Catalysis Society congratulates Dr. Honkala!

Matkakertomuksia / Travel reports

CRS-3 Third International Conference CATALYSIS FOR RENEWABLE SOURCES: FUEL, ENERGY, CHEMICALS – Sicily, Catania, Italy – September 6-11, 2015

The CRS-3 conference was held in Catania, Sicily, Italy, in the beginning of September 2015. The conference was a satellite conference for the Europacat conference that was held on the previous week in Kazan. The conference took place in hotel Sheraton and hosted a total of 80 participants. I participated the conference with two of my colleagues and Professor Juha Lehtonen from Aalto University.

Our journey began with a very early flight from Helsinki via Berlin to Catania. The hotel turned out to be in a slightly isolated area but the scenery was beautiful. Officially, the conference began on Sunday with registration and with an excursion to the Mount Etna. The guide encouraged us to take a piece of Mount Etna with us, so we all took small lava rocks as souvenirs.

On Monday, the lectures began and lasted all day. The first day of lectures was somewhat disappointing since the presenters had severe difficulties in their language skills and their slides were hard to follow. Also my short oral presentation (10 minutes) was on Monday in the smaller conference room. The room was so small that I didn't even need a microphone. I think my presentation went well but the audience was unfortunately very small. Therefore, I didn't need to answer any relevant questions. The welcoming reception was held by the pool side of the hotel (Figure) and we had the opportunity to taste delicious Sicilian tapas.

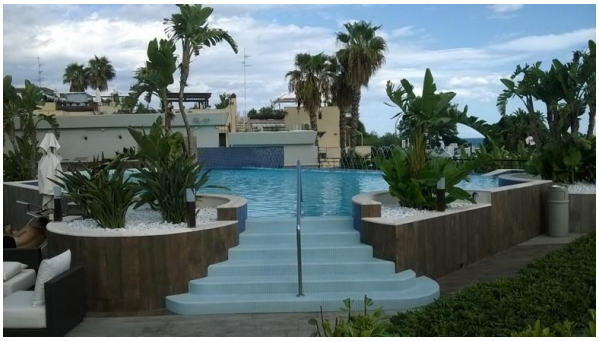

Figure. The pool of Sheraton Hotel in Catania, Sicily, Italy.

On Tuesday, the level of performances stood up. I heard many interesting presentations but only a few were related closely to my topic. My colleague had her oral presentation on Tuesday also in the smaller conference room. Luckily, she had more audience then me. After the lectures, we had a guided tour around Catania. Because of the rainy weather, we spent most of the tour in the bus.

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On Wednesday another colleague of mine kept her presentation (10 minutes) also in the smaller conference room. Her audience was very familiar with her topic and she answered to several very relevant questions. On Wednesday afternoon, a poster session was held but only a handful of posters were presented. The conference banquet was held on Wednesday evening in a beautiful hotel. The food was great, but the schedule was too tight. The organizers should have reserved more time for the dinner.

Thursday was the last day of the conference and, in particular, the plenary lecture by Dmitry Murzin was just awesome. He presented very well his topic, Catalysis in synthesis of biomass derived products with physical properties. His presentation was extremely scientific but he presented it very entertainingly. I would say that Murzin was by far the best presenter of the whole conference.

Our journey back home began on Friday and took around 13 hours because we had to wait our second flight 5 hours in Berlin. But while waiting we visited a traditional German restaurant and enjoyed a very nice lunch. Overall, this conference trip was success and Sicily met all my expectations. Many thanks to the Finnish Catalysis Society for my travel grant!

Travel report written by Tiia Viinikainen, Aalto University

XII EUROPEAN CONGRESS ON CATALYSIS "Catalysis: Blancing the use of fossil and renewable resources"

Three PhD students, namely Ricardo Pezoa Conte, Imane Hachemi and Lidia Godina, participated in the XII European Congress on Catalysis "Catalysis: Balancing the use of fossil and renewable resources" under the sponsorship of the Finnish Catalysis Society. The event took place in Kazan, the capital of the Republic of Tatarstan in the Russian Federation, from August 30th to September 4th. The students represented the Laboratory of Industrial Chemistry and Reaction Engineering, which is a part of the Johan Gadolin Process Chemistry Centre (PCC), a top leading research group in the Åbo Akademi University, Turku. The conference was focused on balancing of fossil and renewable resources, which is considered as a key factor for sustainable development of our society in the upcoming years. All students gave oral presentations during 'Feasibility of Biomass Utilization for Making Fuels and Chemicals' session, and presented scientific posters under the topic of 'Novel Catalytic Materials and Processes for Securing Supplies of Raw Materials'. Especially inspiring were the following fruitful discussions with scientific community and talks given by worldwide leading scientists in the topic of catalysis. Also some time was reserved for various social events organized during the conference, like welcome dinner and sightseeing tour. It was a nice opportunity for many foreigners to explore Kazan, one of the oldest cities in Russia with more than 1000 years of history, in which the cultural mixture between Muslims and Orthodox beliefs make this city an interesting example of multiculturalism and peaceful coexistence.

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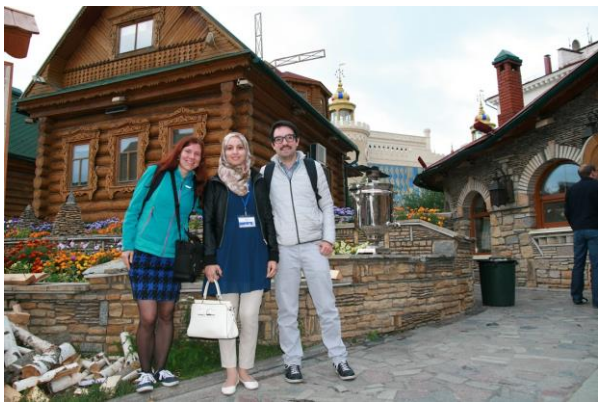
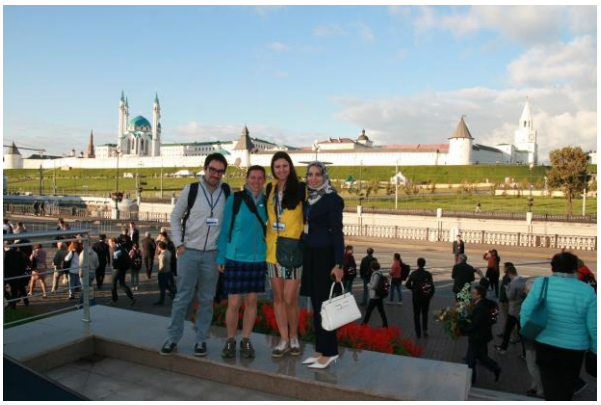


Lidia Godina, Imane Hachemi, Ricardo Pezoa Conte in Tatar`s village, 31st August.

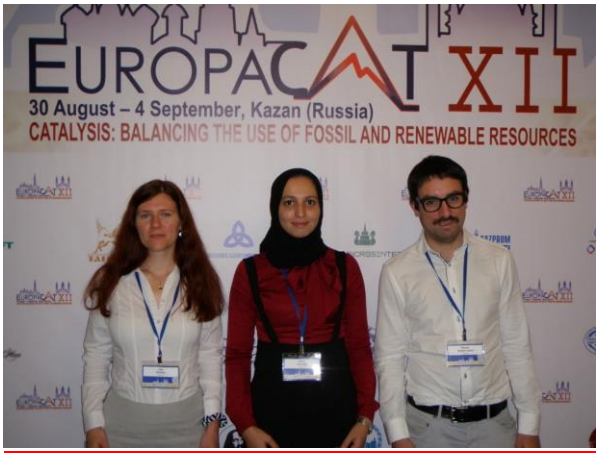


Ricardo Pezoa Conte, Lidia Godina, Alexandra Torozova, Imane Hachemi. Kazan Kremlin, August 31st.

Ricardo Pezoa Conte, Imane Hachemi, Dr. Päivi Mäki-Arvela. Conference's Welcome Reception, Hotel Korston, August 30th.

Lidia Godina, Imane Hachemi, and Ricardo Pezoa Conte are giving oral talks, September 3rd 2015.

Imane Hachemi, Lidia Godina, Ricardo Pezoa Conte. Poster Presentation, Hotel Korston, September 1st.



Lidia Godina, Imane Hachemi. Ricardo Pezoa Conte, Europacat 2015, September 3rd.

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Travel report written by Imane Hachemi, Lidia Godina and Ricardo Pezoa Conte, Åbo Akademi

Katalyysiaiheisia väitöskirjoja syksy 2015 / Catalysis related dissertations in autumn 2015

M.Sc. (Chem.) Anne Heponiemi from the Department of Chemistry, University of Oulu, defended her thesis on 25th of September, 2015. Her thesis is entitled "*Catalytic wet air oxidation of industrial wastewaters. Oxidation of bisphenol A over cerium supported metal catalysts".*

Custodian: Prof. Ulla Lassi, University of Oulu
Opponent: Prof. Claude Descorme, University Claude Bernard Lyon1, France

ABSTRACT
The large amounts of industrial wastewaters, contaminated by hazardous and toxic compounds together with ever tightening legislation, have challenged traditional wastewater treatment methods. Therefore, the development of discharge limits under, cost-effective and ecological wastewater treatment has become an essential concern. Catalytic water phase technologies are interesting alternatives for traditional wastewater treatment. Among them catalytic wet air oxidation (CWAO) has been used successfully in the management of various industrial effluents. However, the development of an active and stable catalyst for the severe reaction conditions of CWAO has proved truly challenging.

The aim of this thesis was to study the activity and stability of laboratory prepared cerium supported metal catalysts in the catalytic wet air and wet peroxide oxidation of aqueous organic pollutants. Ru supported on Ce-Zr mixed oxides and commercial activated carbon as reference were used in CWAO and catalytic wet peroxide oxidation (CWPO) of surface plating industry wastewater. Ag/Ce-Zr and Pt/Ce-Ti catalysts were catalyzed CWAO of aqueous solution of bisphenol A (BPA).

Both CWAO and CWPO improved the abatement of organic compounds from surface plating industry wastewater when comparing the non-catalytic experiments. Moreover, catalytic oxidation enhanced the biodegradability of organic matter in the wastewaters.

According to the results, Pt/Ce-Ti catalysts performed with higher activity in CWAO of BPA than Ag/Ce-Zr catalysts and almost 100% removal of BPA was achieved. The leaching of active metal during oxidation experiments affected the activity of Ag/Ce-Zr catalysts. Moreover, CWAO of BPA was not a surface area specific reaction but the activity of catalysts was related to the chemisorbed oxygen content on the catalysts' surface.

The results of this thesis showed that cerium supported metal catalysts are active and stable catalysts in CWAO of BPA and also in the treatment of industrial wastewater. Therefore, these catalysts could be applied next to pilot scale applications.

M.Sc.(Eng.) Kaisa Lamminpää from the Chemical Process Engineering research group, University of Oulu, defended her thesis on 16th of October, 2015. Her thesis is

entitled "*Formic acid catalysed xylose dehydration into furfural*".

Custodian: Prof. Juha Tanskanen, University of Oulu
Opponent: Docent Arto Laari, Lappeenranta University of Technology

ABSTRACT

Lignocellulosic biomass, such as wood or agricultural residues, is a resource widely available for use in chemical production. In a lignocellulosic feedstock biorefinery, the major parts of biomass, cellulose, hemicellulose and lignin, are converted to valuable chemicals, materials and energy. Furfural production is one option for the use of the pentose sugars available in hemicellulose, and the process could be integrated with the pulp or cellulosic ethanol industry. In the past, furfural production catalysed by organic acids has been in industrial use, but no detailed studies about the kinetics exist. However, the use of organic acid would prevent the waste problems linked to the mineral acids widely used in the furfural industry.

In this thesis, furfural formation in formic acid media was studied. The major part of this work concerns the kinetics of xylose dehydration into furfural and further furfural degradation. Based on the results of this thesis and a literature review, adequate prediction of furfural yield in the conditions used can be achieved using a simple kinetic model, including three reactions: 1) Xylose dehydration into furfural, 2) Furfural degradation, and 3) Xylose degradation to products other than furfural. Moreover, it was shown that the overall order of the furfural degradation reaction, usually modelled as a first order reaction, changes with acidity (H+-concentration). Suggestions for a possible reaction mechanism have been made based on the results.

In the last part of this thesis, furfural formation in the presence of kraft lignin (Indulin AT) was considered. Sulphuric acid was used as a baseline for formic acid. It was shown that the lignin has an acid-neutralising capacity, but the higher pH did not explain all the changes in the xylose conversion and the furfural yield. Thus, it is highly likely the lignin inhibits the formation of furfural. Altogether, the effects were smaller in formic acid than in sulphuric acid.

This thesis confirms the fact that formic acid is an effective catalyst for furfural production. The focus of the thesis was on the reaction kinetics, and the results can be used in conceptual process design. Moreover, the results emphasise the importance of including acidity explicitly in the kinetic model and monitoring acidity changes when real process streams are used.

M.Sc. (Tech.) Sonja Kouva from the Industrial Chemistry research group, Aalto University, will defend her thesis on 6th of November, 2015. Her thesis is entitled "*Temperature-programmed methods for probing surface interactions on catalytic oxide materials*".

Custodian: Prof. Juha Lehtonen, Aalto University
Opponent: Prof. Angelos M. Efstathiou, University of Cyprus

ABSTRACT

Solid oxide materials are used as catalysts on their own or as support materials for metal

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catalysts in order to maximize the available metal surface area. Oxides are widely used in catalysis due to their large specific surface area, thermal resistance, and reasonable cost. In this thesis the investigated materials were zeolite H-ZSM-5 and monoclinic zirconium oxide (ZrO_2, zirconia).

Zeolites are microporous solid acid catalysts and their acidity can be probed, for example, with temperature-programmed desorption (TPD) of ammonia. Ammonia TPD data measured in vacuum were modeled using a transient kinetic methodology, including the diffusion limitations due to the pore structure of zeolite H-ZSM-5 in addition to the ammonia sorption kinetics. The determined adsorption enthalpy and diffusion coefficient are in agreement with literature values obtained using other methods. The model developed for ammonia TPD was further developed in describing toluene TPD data collected in parallel with vacuum and atmospheric TPD setups. The modeling results in terms of both adsorption-desorption interaction and mass transfer were similar to each other despite the radically different experimental systems, implying the soundness of the model used.

Monoclinic zirconia is amphoteric: it has both acidic and basic surface sites. These surface sites were probed using carbon oxides (CO, CO_2) on a set of differently pretreated zirconias. Pretreatments following calcination (hydrogen reduction, water vapor treatment and a combination thereof) modify especially the surface hydroxyl groups and they can significantly reduce the number of cationic Zr^{n+} sites (n = 3, 4). The zirconia surface was investigated with a combination of temperature-programmed surface reaction (TPSR) and infrared spectroscopy (IR) in an extensive temperature range (100-550 °C) in addition to density functional theory (DFT). This combination of methods provides a significantly different view on the surface sites and their interaction with carbon oxides than any of the methods alone.

Kursseja / Courses

Graduate School in Chemical Engineering (GSCE)
REACTION KINETICS
(7 credits /Bologna)

December 7-11, 2015

Åbo Akademi, Teknisk kemi och reaktionsteknik/PCC
Axelia building, Biskopsgatan 8, Åbo/Turku

Lecturers:
Prof. Tapio Salmi, Prof. Dmitry Murzin

Konferenssit ja symposium / Conferences and symposia

The 26th Biennial Organic Reactions Catalysis Society Conference (ORCS)
March 27-31, 2016, Miami, USA
http://www.cvent.com/events/the-26th-biennial-organic-reactions-catalysis-society-conference/invitation-ccb58ebe60ad40bd90c4ba68c4c7ea2e.aspx

The 4th Int'l Conference on Catalysis (ICC 2016)
June 1-3, 2016, Nanjing, China
http://www.engii.org/ws2016/Home.aspx?id=744

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The 16th International Congress on Catalysis (ICC 16)
July 3-8, 2016, Beijing, China
http://www.icc2016china.com/en/

9th International Conference on Environmental Catalysis (ICEC)
July 10-13, 2016, Newcastle, Australia
http://www.icec2016.org/

Katso myös esim./See also e.g.
www.conference-service.com
www.iacs-icc.org/Events/events.html

Internet-osoitteita / Web pages

http://www.katalyysiseura.org

http://www.kemianseura.fi

http://www.efcats.org

Katalyysiseuran hallitus toivoo, että saisimme jäsenkunnaltamme palautetta Katse-lehdestämme ja uutisia julkaistavaksi (esim. väitökset, kansalliset ja kansainväliset tapahtumat, palkinnot, kurssit yms.)! Palautteet ja uutiset voi toimittaa hallituksen jäsenille.

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Katalyysiseuran hallitus / Board of Finnish Catalysis Society

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