

## The official newsletter of the Catalysis Society of South Africa

149-462 NPO

Champagne Sports Resort, South Africa, November 2016

Issue II

### Welcome to CATSA 2016

On behalf of the organizing committee, I would like to welcome all delegates to the CATSA 2016 conference. This year, we are expecting approximately 240 delegates, in line with previous CATSA conferences. We are pleased to see that the broader catalysis community is represented. With the current #feesmustfall situation, most organizations are facing financial potential future problems. We hope that the coming years will not restrict funding for CATSA.

Despite the financial situation in South Africa at large, and the educational sector in specific, we have received excellent support from our sponsors. Without the generosity of all sponsors, organizing an event of this nature would be quite difficult. Their support is highly appreciated. A special thanks to our major sponsors, Shimadzu, Poretech and the UJ Faculty of Science, who have made significant contributions to the 2016 conference.

As has been the tradition for several years now, the 2016 event will once again see a respected scientist receiving the Catalysis Society's Eminent Visitor's award. This year the honor goes to Prof. Peter Wasserscheid from the Friedrich-Alexander University of Erlangen-Nürnberg in Germany. We are extremely privileged to be able to host such a highly reputable researcher and we look forward to his plenary lecture at the conference. Prof. Wasserscheid will conduct his subsequent lecture tour around the country in early December, due to time pressure. This tour will see him visit several universities across the country. We appreciate his willingness to embark on what would be an extremely strenuous schedule and hope that these visits will lead to long-lasting and fruitful interactions with the catalysis community in South Africa. Where possible you are encouraged to attend these seminars and to take the opportunity to interact with Prof. Wasserscheid when he visits your region.

The scientific program-committee had a relatively easy task as there were only a few more requests for oral presentations than what we could allocate to presenters. The program therefore maximizes the amount of student presentations and caters for the needs of the fairly diverse catalysis community in South Africa. You are encouraged to attend as many of the sessions, including those outside of your main research area. I especially urge all of you to support the student presentations as well as the poster session which will feature many of our young researchers. These are the people we need to invest in to ensure the longevity of the society.

Finally, I would like to wish all of you a pleasant conference and I hope that you enjoy both the scientific program as well as the social program that we've put together. I also encourage you to enjoy all the amenities at the Champagne Sports Resort. If there's anything the organizing committee can do to make your CATSA 2016 experience a pleasant one, then please do not hesitate to approach me or any other member of the organizing committee.

### The CATSA Committee 2016

During the Annual General Meeting of the Society, held during the 2015 annual conference, new members to the 2016 CATSA Committee were elected for a two year term. The new committee is as follows:

*Chairperson* | Nico Fischer (UCT)

*Secretary/Treasurer* | Stephen Roberts (UCT) co-opt

*2015 Conference Chair* | Reinout Meijboom (UJ) co-opted

*Media Officer* | Cornie van Sittert (NWU)

*Student Representative* | Tumelo Phaahlamohlaka (WITS) co-opted

Stephen Ojwach (UKZN)

Gary Patrick (Mintek)

Selwyn Mapolie (US)

Dean Brady (WITS)

Masikana Mdleleni (PetroSA/UWC)

Peter Mokhonoana (UL)

Holger Friedrich (UKZN)

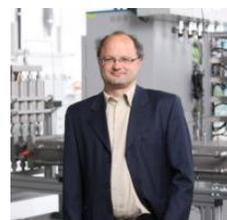
Jack V Fletcher (UCT)

Francois du Toit (Clariant) co-opted

Gregory Govender (SASOL) co-opted



*Prof Reinout Meijboom (UJ), the Chairman of the 2016 annual CATSA Conference.*



*Prof Peter Wasserscheid (University of Erlangen-Nuernberg in Germany).*

*Reinout Meijboom - Conference Chair CATSA 2016*

### From the Chairman of CATSA

Dear Member of the Catalysis Society of South Africa, another year has passed and yet again we meet at our annual national conference - for the 27<sup>th</sup> time. 2016 has been a very interesting year for CATSA and especially for the Committee and I would like to use this opportunity to thank all colleagues who make their time available to contribute to the growth and the wellbeing of our Society. After the successful registration as NPO in 2015 we were faced by a number of challenges such as the registration with SARS as well as VAT registration. A lot of work, especially by our treasurer Mr Stephen Roberts, has gone into these processes and I am delighted to announce that CATSA is now registered with SARS and has received a backdated tax exemption status. This is a great achievement as, at this time last year, one possible scenario saw the Society lose nearly all its savings in taxes and penalties. Although the new status of CATSA comes with a number of new responsibilities it is evidence for our healthy and growing community of active catalysis researchers in South Africa.

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CATSA has in 2016 again supported various students to attend international conferences in China, Norway and France and also supported a number of local students attending the 2016 CATSA conference. We were also represented at the International Association of Catalysis Societies (IACS) meeting which was held in Beijing, China, during the International Congress on Catalysis (ICC). At this meeting San Diego, USA, was elected as the venue of the next ICC in 2020. In addition, it was decided to make \$1000 available for each affiliated society to support one junior researcher to attend the event. Information on the application process will follow in due course.

2016 has also been a year of protests under the banner of #FeesMustFall at various of the South African higher education institutions and has certainly touched our members whether actively involved or affected in conducting research and teaching through protest actions. I hope for a constructive resolution of the raised issues in the near future resulting in an environment supporting research and teaching at high international standards.

Looking forward we have an exciting three days of scientific lectures covering all fields of catalysis ahead of us. I hope you enjoy the interaction with your peers and would like to thank the local organizing committee for their hard work in facilitating this meeting.

Lastly I would like to draw your attention to our next upcoming highlight. In just under 3 months catalysis researchers of global standing will meet in Cape Town to attend the first ever Faraday Discussion on the African Continent themed 'Catalysis for Fuels'. CATSA has made extra funds available for students to attend the meeting and I would like to highlight that the deadline for poster abstracts has been extended to the 14<sup>th</sup> of November. Hope to see all of you at this once in a lifetime opportunity.

## CATSA 2015

The 26th Annual CATSA CONFERENCE took place at Arabella Hotel & Spa, Kleinmond, Cape Town over the period 15th to 18th November 2015. The conference was attended by 230 delegates, of which 102 were post-graduate students. As has been the case in recent years, the scientific programme catered for all the subdivisions of catalysis and it was encouraging to see an increased number of delegates from both the electrocatalysis as well as biocatalysis fraternity. Over the two and half days of the technical programme, talks in both these sections were fairly well supported. The CATSA 2015 eminent visitor was Prof. Martin Albrecht from the University of Bern, Switzerland. His keynote address dealt with the developments of new mesoionic N-heterocyclic complexes and their versatile application in a range of catalytic oxidation reactions.

Apart from the lecture by the Eminent Visitor, we also managed to afford 50 other delegates the opportunity to give oral presentations at the conference. Several of these talks were given by students and as has been the situation in recent years, the standard of these student presentations was really top notch. The prize for the best student oral went to Thulani Nyathi from Chemical Engineering at UCT. Most of the student delegates presented their research results as posters and here it was also clear that the quality of posters reflected the great effort put in by most students. The judges who had to evaluate the best poster prize had a really difficult time arriving at a final decision, given the large number of excellent posters. The best poster prize went to Anna Petersen also from Chemical Engineering at UCT. The academic institutions associated with the society can be proud about the quality of post-graduates being produced.

In terms of social activities, CATSA 2015 did not disappoint. Several events were arranged over the three days of the conference, starting with the traditional Clariant sponsored ice-breaker and culminating in the Gala dinner where many delegates, especially the students really went to town in dressing up and letting their hair down. In between we had the both the Poretech challenge as well as the student challenge. The Poretech challenge was won by the chemists after a tight competition which required a tie-breaker to decide the winner. The student challenge was won by "die manne" from KOVSIES who braved a chilly wind to dominate the pool volleyball competition.



*The prize for the best student oral at CATSA 2015 went to Thulani Nyathi from Chemical Engineering at UCT*



*The prize for the best student poster at CATSA 2015 went to Anna Petersen from Chemical Engineering at UCT*



*The Poretech challenge at CATSA 2015 was won by the chemists*



*Prof Martin Albrecht (University of Bern, Switzerland) the Eminent Visitor at CATSA 2015*

In general from all the feedback received CATSA 2015 was an overwhelming success. Everyone loved the venue and in addition the science was also not too bad. As is to be expected, such events can only succeed if everything falls into place and for this I would like to thank my fellow committee members, the student helpers and all the delegates that attended. In addition my sincere appreciation goes out to all our sponsors who despite the difficult financial climate came forward with generous donations to ensure that we were able to host a successful conference without having to worry about breaking the Society's bank balance.

SF Mapolie

Chairperson CATSA 2015 organizing committee.



*Prof Peter Mokhonoana (UL), the Chairman of the 2017 annual CATSA Conference.*

## Outlook CATSA 2017

The 28<sup>th</sup> annual conference of the Catalysis Society of South Africa will take place on the 19-22 November 2017 at the Kwa Maritane Bush Lodge, Pilanesberg in the North-West Province of South Africa. It is co-hosted by the Universities of Limpopo and South Africa (UL/UNISA). The conference venue is about 180 km from Johannesburg and 150 km from Pretoria. The venue can accommodate about 250 delegates, but the mammals will outnumber us – over 300 species of mammals and 300 bird species in the National Park!

The eminent visitor will be Prof. Krijn P. de Jong (Utrecht University)

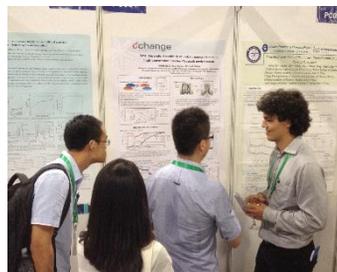
*Peter Mokhonoana -  
Conference Chair CATSA 2017*



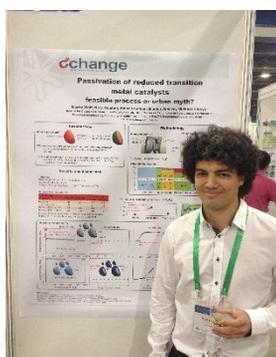
*Prof Krijn P. de Jong (Utrecht University)*

## Student travel grants 2016

The Catalysis Society of South Africa offers every year a number of travel grants to students based at a South African institution to support attendance of local or international conferences. The grants are awarded based on a competitive application reviewed by the Committee (for more information see <http://www.catsa.org.za/awards/student-travel-awards>). In 2016 four grants were awarded, to Anna Petersen (PhD, UCT), Moritz Wolf (PhD, UCT), Yi Zhou (PhD, UCT) and Singobile Mahlaba (MSc, UKZN). As part of the award the students are requested to share their experience and gathered insights at the attended event with the Society.



*Moritz Wolf (UCT)* received the CATSA Student Travel Grant in the category of International Catalysis Conferences for his attendance at the 16<sup>th</sup> International Congress on Catalysis (ICC16) in Beijing, China, from the 3<sup>rd</sup>-8<sup>th</sup> July 2016. Moritz presented two posters entitled 'Size dependent stability of cobalt nanoparticles in high conversion Fischer-Tropsch environment' and 'Passivation of reduced transition metal catalysts – feasible process or urban myth?' in the two poster sessions, which attracted the attention of numerous conference delegates. The conference featured 2 award lectures of the International Association of the Catalysis Societies (IACS), 5 plenary lectures, 18 keynote lectures, 81 invited lectures, and 202 oral presentations. The IACS Award Lecture by David Farrusseng (IRCELYON, CNRS, France) 'Catalysis inside a box' on metal particles inside a zeolite 'box' as tuneable, sintering resistant, and well defined heterogeneous catalysts was outstanding. Bruce C. Gates, Charles T. Campbell, and Mathias Beller gave excellent plenary lectures. The six parallel sessions covered all kind of topics on catalysis: 'Catalysts for Energy', 'Photocatalysis', 'Biomass Conversion', 'Carbon-based catalysts', 'Fischer-Tropsch synthesis', and many more. Single-atom catalysts were one of the most discussed catalytic systems and are bridging the gap between heterogeneous and homogeneous catalysis. The keynote lecture on this topic by Tao Zhang (Dalian Institute of Chemical Physics, CAS, China) was outstanding. The ICC congresses are an ideal opportunity to get to know the faces behind all the papers, to network with researchers from all over the world, and to improve the expertise in the field of



catalysis inside and outside the comfort zone. The next ICC will be held in San Diego, United States of America, in 2020.

*Anna Petersen (UCT)* gave an oral presentation at the Natural Gas Conversion Symposium (NGCS 11) held from the 5<sup>th</sup> to the 9<sup>th</sup> of June 2016 in Tromsø, Norway. The conference featured over 100 oral presentations and two poster sessions and attracted over 300 participants. A large portion of the work presented revolved around cobalt based Fischer-Tropsch synthesis. Other prominent topics were dry or steam reforming and methane activation and recent developments in catalyst characterization, such as the increasing use of synchrotron based X-ray characterization such as XANES and EXAFS, CO-DRIFTS as well as magnetic measurement techniques such as the magnetometer presented by Michael Claeys and the use of ferromagnetic NMR for the evaluation of particle size and crystalline phase of cobalt presented by Christian Meny from the University of Strasbourg. 4 Plenary lectures were given by Jim Rekoske, Gary Jacobs, Prof. Unni Olsbye and the recipient of the Award for Excellence in Natural Gas Conversion Prof. Xinhe Bao from the Chinese Academy of Sciences. Prof. Bao gave a fascinating talk on his wide field of research ranging from direct methane conversion to CO hydrogenation, which lead to over 500 publications and 100 patents.

*Yi Zhou*, an PhD student from the University of Cape Town gave poster presentation at the 16<sup>th</sup> International Catalysis Congress (ICC) in Beijing from 3 to 8 July, 2016. ICC held once every four years, exists to bring together catalysis researcher and the industry to discuss recent research and exchange knowledge about the developments in catalysis science and technology in renewable energy, clean and efficient production and utilization of fossil resources and technologies to achieve low carbon economy. The event was perfectly organized under the direction of Professor Can Li of Dalian Institute of Chemical and Physics, and greatly enjoyed by participants from all over the world. The scientific program consisted of more than 300 talks and about 1700 poster presentations. A total of more than 2500 delegates attended this congress. Yi presented a poster entitled 'LT-PEMFC hydrogen

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production: three-stage PGM catalysed fuel processor'. The work presented compares the precious group metal based catalyst for steam methane reforming, water-gas shift and CO selective methanation reactions in the three-stage fuel processing train, fuel cell grade hydrogen production was achieved at the studied system conditions. Few important lectures were also given in the conference in the field of fuel cell grade hydrogen production. Professor Xenophon Verykios from Greek University of Patras and Professor Jingyue Liu of Arizona State University presented ethanol and methanol steam reforming studies respectively in the conference. They both gave some insights of utilizing PGM catalysts in their studies, potential scientific collaboration with respect to high throughput catalyst synthesis and screening were discussed. Dr Rodolfo Mafessanti from the University of Bologna in Italy gave an interesting lectures on producing pure hydrogen through Pd membrane reactor, which showed to be effective to obtain 100% pure hydrogen stream. The effectiveness has been demonstrated with promising results that can lead to a compact and well integrated process for fuel cell grade hydrogen production system. It was without a doubt an invaluable experience to have attended the ICC 2016 in Beijing and financial support from CATSA was greatly appreciated.

The second European Summer School on Catalyst Preparation took place in the week of 12 to 17th June in France this year, and I (*Singobile Mahlaba*) was fortunate to be amongst the 110 participants in the program, which consisted of 15 academics, 30 persons from industry, and 65 PhD/Postdocs/MSc students. I was counted among the very few MSc students. The lectures touched on topics that are normally taken for granted, such as various ways of catalyst preparation and activation, which requires a lot more thought than I actually realised. In addition, I also learned about the applicability of catalysts on an industrial scale, and the challenges of taking a new catalyst from the lab to an industrial plant. The highlight of the social part of the summer school for me was a visit undertaken to the Pont d'Arc Cavern. From a scientific perspective, the lectures that I found relevant to my work, and made me realise the gaps in my knowledge were given by P. de Jongh from Utrecht (Impregnation and drying), S. Pollington from Johnson Matthey (Activation) and C. Copèret from ETH Zürich (Surface molecular chemistry).

We also went to visit Eurecat, a company that specialises in catalyst regeneration. This was particularly relevant as my project involves the deactivation and regeneration of hydrogenation catalysts.

To conclude, attending the summer school at this point in my career has been beneficial, as I will be able to utilize the information obtained in my PhD studies, which commence next year.



## Awards received by CATSA member

*Nico Fischer* from the University of Cape Town was awarded the Young Scientist Prize 2016 in recognition of the excellent scientific contribution presented as the main author at the 16<sup>th</sup> International Congress on Catalysts in Beijing, China.

*Sue Harrison* from the University of Cape Town and programme manager of the c\*change Paraffin Activation programme, was awarded the 2015/2016 NSTF-South32 Award in the category for engineering capacity development over the last five to ten years.

ROYAL SOCIETY OF CHEMISTRY

Organised by the Faraday Division in association with the Environment, Sustainability and Energy Division (ESED)

24–26 January 2017, Cape Town, South Africa

# Catalysis for Fuels

Faraday Discussion

Themes	Speakers	Scientific Committee
<b>Catalysts for Fuels insights from theory</b>	Michael Claeys University of Cape Town	Graham Hutchings (Chair) Cardiff University
<b>Designing new catalysts for synthetic fuels</b>	Avelino Corma ITQ, Valencia	Paul Collier Johnson Matthey
<b>Hydrocarbon conversion</b>	Kazunori Domen University of Tokyo	Nail Coville University of the Witwatersrand
<b>Novel photocatalysts: do they provide a viable option?</b>	Philip Gibson Sasol	Nico Fischer University of Cape Town
	Enrique Iglesia University of California, Berkeley	Hans Niemantverdriet Eindhoven University of Technology
	Nora de Leuzau Cardiff University	Eric van Steen University of Cape Town
	Can Li Dalian Institute of Chemical Physics	
	Ding Ma Peking University	
	Matt Neurock University of Minnesota	
	Ulriki Olafby University of Oslo	

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rsc.li/fuels-fd2017

Registered charity number: 207960

To facilitate the attendance of post graduate students, CATSA has decided to make additional funding available, earmarked for the Faraday Discussion 2017, through its established 'Student Travel Grant for International Conferences hosted in South Africa'. In comparison to the previous policy, applying for a travel grant for an international conference hosted in South Africa will no longer affect the eligibility to apply for a 'Student Travel Grant for International Conferences hosted Overseas'. An updated protocol in this regard is available on the CATSA website (<http://www.catsa.org.za/awards/student-travel-awards>). In addition it is recommended for students to join the South African Chemical Institute (SACI – annual fee approximately R125) to be eligible for the reduced RSC membership registration fee for the Faraday Discussion.

**Sudoku**

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<http://1sudoku.com>

n° 423290 - Level Expert

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<http://1sudoku.com>

n° 41573 - Level Expert

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<http://1sudoku.com>

n° 510259 - Level Evil

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<http://1sudoku.com>

n° 5406 - Level Evil

Play on your mobile these puzzles and find their solutions by flashing the codes below :

n° 423290



n° 41573



n° 510259



n° 5406



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### From the Editor

Dear member of the Catalysis Society of South Africa, without your contributions a newsletter is not possible. The purpose of the newsletter is to serve as a platform to report on new developments and past year's events. For this reason I would like to invite all Society members to send contributions to me in good time before the next CATSA conference.

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