



## 14<sup>th</sup> Annual UNESCO/IUPAC Workshop & Conference on Macromolecules & Materials, Stellenbosch, South Africa

10 April 2017 (Workshop), 11-13 April 2017 (Conference)



### CONFERENCE REPORT

This UNESCO/IUPAC Conference was the 14<sup>th</sup> in a series of annual conferences. The conference chairs comprised of Prof B Klumperman (University of Stellenbosch, South Africa) and Prof A Rowan (Australian Institute for Bioengineering and Nanotechnology (AIBN)). The local and programme committee comprised of Prof H Pasch, Prof AJ van Reenen, Prof PE Mallon, Prof B Klumperman and Aneli Fourie (University of Stellenbosch, South Africa).

The website is: <http://academic.sun.ac.za/unesco/>

A satisfactory number of delegates (110 participants) participated which included UNESCO/IUPAC Workshop, 10 April 2017, UNESCO/IUPAC Conference, 11-13 April 2017, represented 11 countries other than South Africa. The total official number of students who actively participated in the UNESCO/IUPAC Conference is 52. Other western countries represented were Australia, Belgium, China, France, Germany, Romania, South Africa, Switzerland, Thailand, Netherlands, United Kingdom and USA.

The UNESCO/IUPAC Conference was opened by Prof H Pasch, IUPAC Representative, Distinguished Professor, FRSSAf and SASOL Chair in Analytical Polymer Science, University of Stellenbosch, Department of Chemistry and Polymer Science, University of Stellenbosch, South Africa and Prof Eugene Cloete, Vice-Rector (Research, Innovation and Postgraduate Studies, University of Stellenbosch, South Africa).

The following 5 talks were presented at **UNESCO/IUPAC Workshop, 10 April 2017**:

- Lutz, Jean-Francois: Institut Charles Sadron, France  
An introduction to sequence-controlled polymers
- Stayton, Patrick: University of Washington, USA  
Opening the intracellular target space to biological drugs with bioactive polymers
- Dafforn, Tim: University of Birmingham, UK  
It is not a magic trick ... membrane protein purification WITHOUT detergent

- Pasch, Harald: University of Stellenbosch, South Africa  
Chemical composition and microstructure analysis of polymers by multidimensional column- and channel-based separations
- Kouwer, Paul: Radboud University Nijmegen, The Netherlands  
Mechanical properties of responsive soft hydrogels

56 talks were presented at **UNESCO/IUPAC Conference, 11 – 13 April 2017** (from which 4 were plenary speakers, 23 invited speakers and 29 oral submissions), by experts in their field, recording the state-of-the-art in various fields, often encompassing the last few years of research. All others were accommodated in a lively poster session especially popular for student presentations.

21 Posters were selected and presented at the poster session on Tuesday, 11 April 2017 at the UNESCO/IUPAC Conference, the standard of which was very good. Three IUPAC poster prizes were awarded to the following young scientists (MSc / PhD level):

**Lisa Fortuin,**

University of Stellenbosch, Department of Chemistry & Polymer Science, Stellenbosch 7600 South Africa

Poster entitled: “Targeted antimalarial polymeric prodrugs”

**Sibusisiwe Maseko,**

Cardiovascular Research Unit, University of Cape Town, Cape Town 7925 South Africa

Poster entitled: “Tissue engineered hydrogels for gene therapy”

**Nonkululeko Radebe,**

University of Stellenbosch, Department of Chemistry & Polymer Science, Stellenbosch 7600 South Africa

Poster entitled: “Multidimensional analysis with field flow fractionation and Fourier transform



Talks of the UNESCO/IUPAC Conference 2017 included the following topics:

**Plenary Speakers:**

- Rowan, Alan: Australian Institute for Bioengineering and Nanotechnology (AIBN), Australia, “Biomimetic polymers for cellular control”
- Dafforn, Tim: University of Birmingham, UK  
“Detergent free purification of membrane proteins using styrene-maleic acid co-polymer nanoencapsulation”

- Stayton, Patrick: University of Washington, USA  
"Molecular engineering of biologic drug therapies and diagnostic platforms"
- Ulijn, Rein: CUNY Advanced Science Research Center, USA  
"Repurposing peptides for materials and nanotechnology"

#### **Invited Speakers:**

- Lutz, Jean-Francois: Institut Charles Sadron, France  
"Design and applications of digital polymers"
- Du Prez, Filip: Ghent University, Belgium  
"Thiolactone groups as functional handles: From double end group modification to macromolecular lineups"
- Hutchings, Lian: Durham University, United Kingdom  
"Monomer sequence control via living anionic polymerization"
- Grubbs, Robert: Stony Brook University, USA  
"Building organic materials from the bottom up with self-assembling block copolymers"
- Van Hest, Jan: Radboud University Nijmegen, The Netherlands  
"Functional polymersomes for application in nanomedicine"
- Pasch, Harald: University of Stellenbosch, South Africa  
"Multidetector thermal field-flow fractionation for monitoring the structure and dynamics of block copolymericelles"
- Wilhelm, Manfred: Karlsruhe Institute of Technology (KIT), Germany  
"Correlating chemical structure and polymer weight via SEC-IR detection with a new COL laser spectrometer"
- Kilz, Peter: PSS Polymer Standards Service GmbH, Germany  
"Bottom-up characterization of synthetic and natural macromolecules by hyphenated chromatographic techniques"
- Aubin-Tam, Marie-Eve: Delft University of Technology, The Netherlands  
"Functionalization of SMA nanodiscs"
- Klok, Harm-Anton: Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland  
"Engineering cell surfaces with synthetic polymers"
- Killian, Antoinette: University of Utrecht, The Netherlands  
"The styrene-maleic acid copolymer: A versatile tool in membrane research"
- Douglas, Trevor: Indiana University, USA  
"Hierarchical assembly of virus-based nanoreactors"
- Frey, Holger: Johannes Gutenberg University Mainz, Germany  
"Tailormade polyether architectures: From hyperbranched poly(ethylene glycols) to polyethers with functional side chains and degradable PEG-nanoparticles"
- Schönherr, Holger: University of Siegen, Germany  
"Exploiting designer polymer brushes for tailored cellular microenvironments with completely

decoupled biochemical cues, mechanical properties, nanopatterns and controlled topography in 3D"

- Zhang, Huiqi: Nankai University, P.R. China  
"Preparation of water-compatible molecularly imprinted polymer micro- or nanoparticles for bioanalytical applications"
- Bruns, Nico: Adolphe Merkle Institute, Switzerland  
"Biocatalytic ATRP as diagnostic tool for the detection of blood-related diseases"
- Howdle, Steve: University of Nottingham, United Kingdom  
"Polymers, renewables and supercritical carbon dioxide"
- Hiller, Wolf: Technische Universität Dortmund, Germany  
"Characterization of micelles by NMR spectroscopy"
- Lederer, Alben: Leibniz-Institute für Polymerforschung, Germany  
"Biomacromolecules and biohybrid systems – in-situ characterization of interaction properties"
- Kouwer, Paul: Radboud University Nijmegen, The Netherlands  
"Ultra-responsive soft matter from strain-stiffening hybrid gels"
- Wilson, Daniela, Radboud University Nijmegen, The Netherlands  
"Nanomotors via a polymeric supramolecular approach"
- Bezuidenhout, Deon: Cardiovascular Research Unit (CRU), South Africa  
"Polymeric scaffolds for tissue regeneration"
- Van Esch, Jan: Delft University of Technology, The Netherlands  
"Fuel-driven active materials"

#### **Oral Contributions:**

- Kargaard, Anna: University of Stellenbosch, South Africa  
"Recent progress in RAFT polymerization of *MVP*"
- Wuest, Killian: Karlsruhe Institute of Technology (KIT), Germany  
"Light-induced grafting of functional polymers to nanodiamonds"
- Thierfelder, Nikolaus: Cardiovascular Research Unit (CRU), South Africa  
"Classic tissue engineering and regenerative approaches in cardiovascular research"
- Mugenana, Clément: Adolphe Merkle Institute (AMI), Switzerland  
"Magneto-responsive amphiphilic polymer conetwork microcapsules"
- Mutlu, Hatice: Karlsruhe Institute of Technology (KIT), Germany  
"Efficient avenues towards the functionalization of unsaturated polymers"
- Goonoo, Nowsheen: University of Siegen, Germany  
"Electrospun poly(ester-ether)/polysaccharide blend fibers for bone tissue engineering"
- Shi, Tonfei: Changchun Institute of Applied Chemistry, P.R. China  
"In-situ study of the solvent annealing process of thin polymer film"

- Gameiro, Mariana: University of Nottingham, United Kingdom  
"Novel and sustainable method to develop greener polymers"
- Ji, Xiangling: Changchun Institute of Applied Chemistry, P.R. China  
"Responsive behavior of PDMAEMA-based brushes grafted on silica nanoparticles"
- Jiang, Wei: Changchun Institute of Applied Chemistry, P.R. China  
"Amphiphilic block copolymer vesicle formation and its behavior in selective solvent"
- Pfukwa, Rueben: University of Stellenbosch, South Africa  
"Study of the synthesis of polyaldehyde via organocatalytic anionic polymerization"
- Schmieden, Dominik: Delft University of Technology, The Netherlands  
"Using bacteria to make improved, nacre-inspired materials"
- Arnold, Thomas: Diamond Light Source, United Kingdom  
"A comparison of lipid nanodiscs (SMALPS) made from three different polymers at their effects on the exchange of lipids with lipid monolayers"
- Hurrle, Silvana: Karlsruhe Institute of Technology (KIT), Germany  
"Two-in-one:  $\lambda$ -orthogonal photochemistry on a radical photoinitiating system"
- Buzzacchera, Irene: NovioSense BV, The Netherlands  
"Polysaccharide based coatings for tissue integrated medical sensor devices"
- Stribeck, Almut: University of Hamburg, Germany  
"Morphology evolution mechanisms in polyurethane materials studied by small-angle- X-ray scattering"
- Griebenow, Sascha: Technische Universität Darmstadt, Germany  
"Influence of the refractive index increment on GPC-MALLS analysis of technical EVA-copolymers"
- Androsch, Rene: Martin Luther University Halle-Wittenberg, Germany  
"Analysis of the  $\alpha'$ / $\alpha$ -crystal transition in poly (L-Lactic acid) (PLLA)"
- Pflug, Kristina: Technical University Darmstadt, Germany  
"Describing transfer-to-polymer correctly or the task of analyzing long-chain branches quantitatively"
- Duchateau, Jan: SABIC, The Netherlands  
"Novel process for high pressure co-polymerization of ethylene and alkyne containing chemicals"
- Rothfuss, Hannah: Karlsruhe Institute of Technology (KIT), Germany  
"Platinum-complexed SCNPS: The first reusable homogeneous catalysts in chemical reactions"
- Badi, Nezha: Ghent University, Belgium  
"Multifunctional dendrimer-like and sequence-defined polymeric systems using thiolactone chemistry"

- Van den Bergh, Wihan: Cardiovascular Research Unit (RCU), South Africa  
"In vivo response to tissue engineered electrospun scaffolds with drug delivery and enhanced porosity"
- Gegenhuber, Thomas: Karlsruhe Institute of Technology (KIT), Germany  
"Step-growth polymers as macro chain transfer agents – an experimental and theoretical study"
- Dou, Xiaogiu: University of Siegen, Germany  
"Bio-inspired hierarchical and functionalized surface structures for efficient capture and release of circulating tumor cells"
- Van Rooyen, Louis: Tshwane University of Technology (TUT), South Africa  
"Graphene filled PTFE composites with improved wear resistance and gas barrier properties"
- Mukwada, Lesley: University of the Free State (Qwaqwa Campus), South Africa  
"Structure and properties of PLA/PCL blend nanocomposites with Mg(OH<sub>2</sub>) and APTMS-TiO<sub>2</sub>"
- Motaung, Tshwafo: University of Zululand, South Africa  
"The influence of supermasscolloider on the morphology of sugar cane bagasse and bagasse cellulose"
- Mochane, Mokgoatsa: University of Zululand, South Africa  
"Preparation of polymer/graphite composites for improvement in thermal conductivity and flammability resistance"

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- IUPAC: Contact person: Richard Hartshorn  
IUPAC Secretariat, PO Box 13737, Research Triangle Park, NC 27709 USA
- Kansai Plascon: Contact person: Reda Fleet  
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University of Stellenbosch, Stellenbosch 7600 South Africa

The Conference Banquet was held at The Wallenberg Research Centre @ STIAS. The Kronendal Music Academy Jazz Band from Hout Bay entertained the delegates during the banquet and was greatly enjoyed by all. The Social Tour Programme which included tours in and around Stellenbosch and Cape Town was arranged by Bettina Tours & Shuttle Service and was thoroughly enjoyed by accompanying persons and participants.

**Prof Bert Klumperman**: Conference Chairman

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