



## The 13<sup>th</sup> International Conference on Advanced Polymers via Macromolecular Engineering

15-18 April 2019, Wallenberg Conference Centre @ STIAS  
Stellenbosch, South Africa



### CONFERENCE REPORT

The 13<sup>th</sup> International Conference on “Advanced Polymers via Macromolecular Engineering” (APME 2019) was held in the beautiful historic town of Stellenbosch in South Africa from 15-18 April 2019. The conference chairs comprised of Prof Bert Klumperman (University of Stellenbosch, South Africa), Dr Munmaya Mishra (Altria – Center for Research & Technology, USA) and Prof Yusuf Yagci (Istanbul Technical University, Turkey). The local and programme committee comprised of Prof Bert Klumperman, Prof Albert van Reenen, Prof Harald Pasch and Prof Peter Mallon (University of Stellenbosch, South Africa). The scientific committee comprised of Dr Michel Baltas (CNRS, University of Toulouse, France), Prof Dominique Bonnet (University of Strasbourg, France), Dr Gilbert Lassale (Evotec, France), Prof Sebastien Papot (University of Poitiers, France), Dr Michel Perez (Pierre Fabre, France), Prof Janos Sapi (SCT & University of Reims-Champagne-Ardenne, France), Dr Luc van Hijfte (SCT & Novithera, France). The scientific advisory board comprised of Prof Lian Hutchings (University of Durham, United Kingdom), Prof Eva Harth (University of Houston, USA), Dr Jean-Francois Lutz (Institut Charles Sadron, France), Prof Filip Du Prez (Ghent University, Belgium) and Prof Hölger Schonherr (University of Siegen, Germany).

The website is: <http://academic.sun.ac.za/apme/index.html>

A satisfactory number of delegates (180 participants) participated, represented 25 countries other than South Africa. The total official number of students who actively participated in APME 2019 Conference is 72. Other western countries represented were Australia, Belgium, Brazil, Canada, China, France, Germany, Hungary, Ireland, Israel, Italy, Korea, Malaysia, Nigeria, Portugal, Russia, Saudi Arabia, Singapore, Spain, Switzerland, The Netherlands, Turkey, United Kingdom and USA.

The APME 2019 Conference was opened by Prof Yusuf Yagci, IUPAC Representative, Istanbul Technical University, Turkey, and Prof Eugene Cloete, Vice-Rector (Research, Innovation and Postgraduate Studies, University of Stellenbosch, South Africa).

92 talks were presented at **APME 2019, 14 – 18 April 2019** (from which 12 were plenary/keynote speakers, 41 invited speakers and 39 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.

41 Posters were selected and presented at the poster session on Tuesday, 16 April 2019 at the APME 2019 Conference, the standard of which was very good. The Royal Society of Chemistry (Laura Fisher) sponsored three cash poster prizes and 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: "Biodegradable polymeric prodrugs for the targeted delivery of artemether-lumefantrine"

**Jana Kohn**, Humbolt-Universität zu Berlin, Germany

Poster entitled: "Expanding chemical space of mussel-inspired polymerization toward multifunctional monomers"

**Elizalde Iraizoz Fermin**, University of Basque Country UPV/EHU, Spain

Poster entitled: "Dynamically crosslinked thermos-responsive polyurethanes"

Wiley-VCH: Macromolecular Journals (Kirsten Severing) sponsored two cash prizes for best talk and were awarded to the following young scientists (MSc / PhD level):

**Hannes Houck**, Ghent University, Belgium

Talk entitled: "Light-stabilised dynamic materials"

**Kristina Pflug**, University of Hamburg, Germany

Talk entitled: "Closing the circle of microstructure and polymer properties for polyethylene via a combined analytical and modelling approach"

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

#### **Plenary/Keynote Speakers:**

- **Matyjaszewski, Kris**: Plenary, Carnegie Mellon University, USA, "Advanced nanostructured materials by atom transfer radical polymerization"
- **O'Reilly, Rachel**: Keynote, University of Birmingham, United Kingdom "Precision polymer nanoparticles"
- **Stenzel, Martina**: Keynote, University of New South Wales, Australia "Origami with sugar based polymers to create self-assembled nanoparticles for drug delivery"
- **Russell, Alan**: Plenary, Carnegie Mellon University, USA "Polymer-enhanced biomacromolecular systems"
- **Stingelin, Natalie**: Keynote, Georgie Institute of Technology, USA "Cool plastics for a greener world"
- **Dafforn, Tim**: Keynote, University of Birmingham, United Kingdom "A solution for an age old biochemical problem"
- **Du Prez, Filip**: Plenary, Ghent University, Belgium "Sequence-defined macromolecules: Engineering materials with biological precision"

- Armes, Steven: Keynote, Sheffield University, United Kingdom  
"Hydrogen-bonded worm gels prepared by RAFT dispersion polymerization in non-polar media"
- Pentzer, Emily: Keynote, Case Western Reserve University, USA  
"2D particle size surfactants and their use to architect advanced materials"
- Bowman, Christopher: Plenary, University of Colorado, USA  
"Clicking polymer networks together: Approach to form smart, functional polymer networks from click chemistry"
- Hillmyer, Marc: Keynote: University of Minnesota, USA  
"Harnessing disorder in self-assembled block polymers for functional nanostructured materials"
- Haddleton, David: Keynote: University of Warwick, United Kingdom  
"Copper mediated living radical polymerization in the presence of oxygen"

#### **Invited Speakers:**

- Junkers, Tanja: Monash University, Australia  
"Self-optimizing high-throughput precision continuous flow polymer synthesis"
- Heise, Andreas: Royal College of Surgeons in Ireland, Ireland  
"Star-shaped polypeptides as efficient nanocarriers for gene delivery in bone regeneration"
- Gigmes, Didier: Aix Marseille University, France  
"Development of peroxides alternatives"
- Zhang, Huiqi: Nankai University, P.R. China  
"New approaches to obtaining water-compatible molecularly imprinted polymer nanoparticles for bioanalytical and biomedical applications"
- Brook, Michael: McMaster University, Canada  
New opportunities with silicone elastomers using sulphur chemistry: Cure, organofunctionalization and recycling"
- Ameduri, Bruno: Institute Charles Gerhardt, France  
"A journey from the synthesis of functional 2-trifluoro-methacrylate monomers to their radical copolymerizations with vinylidene fluoride and applications"
- Becer, Remzi: University of Warwick, United Kingdom  
"Glycopolymer code: Towards selective lectin recognition tuned by sequence and folding in macromolecules"
- Acar, Metin H: Istanbul Technical University, Turkey  
"Amphiphilic GRAFT copolymer as shape memory materials"
- Pasch, Harald: University of Stellenbosch, South Africa  
"Analytical lego as a tool for polymer nanostructure elucidation"

- Hadjichristidis, Nikos: KAUST, Saudi Arabia  
"Synthesis of tetracrystalline quarterpolymer PE-*B*-PEO-*B*-PCL-*B*-PLLA by combination of polyhomologation and organic/metal "catalyst switch" strategy"
- Hoogenboom, Richard: Ghent University, Belgium  
"Effect of cyclic imino ether side chains and ring-size on the cationic ring-opening (co)polymerization"
- Cunningham, Michael: Queen's University, Canada  
"Carbon dioxide switchable polymers and processes"
- Gao, Haifeng: University of Notre Dame, USA  
"Developing hyperbranched polymers with simplicity and controllability"
- Mishra, Munmaya: Altria Client Service LLC, USA  
"Controlled polymerization and supercritical CO<sub>2</sub> assisted immobilization of actives"
- Klok, Harm-Anton: École Polytechnique Fédérale de Lausanne, Switzerland  
"Macromolecular engineering at living and synthetic surfaces"
- Mano, João: Aveiro Institute of Materials, Portugal  
"Using natural-based polymers as building blocks in bottom-up tissue engineering applications"
- Schönherr, Holger: University of Siegen, Germany  
"Stimuli-responsive polymer systems for rapid diagnostics of bacterial infections and contaminations"
- Voit, Brigitte: Leibniz-Institute für Polymerforschung, Germany  
"Responsive nanocapsules and multicompartments by templating approaches"
- Laus, Michelle: Università del Piemonte, Italy  
"Toward deterministic doping: A bottom-up approach by self-limiting reactions"
- Topham, Paul: Aston University, United Kingdom  
"Block copolymer self-assembly: Rinse-resistant superhydrophobic fabrics made using a combination of electrospinning and electrospraying"
- Dove, Andrew: University of Birmingham, United Kingdom  
"Controlling the properties of degradable biomaterials through intelligent chemical design"
- Lederer, Albena: Leibniz-Institut für Polymerforschung, Germany  
"Nanoparticle diffusion through a polymersome membrane investigated by AF4"
- Duchateau, Rob: SABIC Technology & Innovation, The Netherlands  
"Functionalized polyolefins: Synthesis, applications and industrial relevance"
- Grubbs, Barney: Stony Brook University, USA  
"Making macromolecules for functional materials"
- Kempe, Kristian: Monash University, Australia  
"Spontaneous zwitterionic copolymerization (SZWIP) – a facile technique for the synthesis of functional polymers"

- Bezuidenhout, Deon: University of Cape Town, South Africa  
"Biomaterials for transcatheter heart valve devices"
- Venkatraman, Subbu: Nanyang Technological University, Singapore  
"Bio-inspired polymers and systems to solve long-standing medical problems: Small-diameter blood vessels"
- Langlais, Marvin: University of Stellenbosch, South Africa  
"Thiolactone-functional reversible deactivation radical polymerization agents for advanced macromolecular engineering"
- Abetz, Volker: Universität Humburg, Germany  
"Synthesis and characterization of thermoreversible polymer networks"
- Börner, Hans: Humbolt-Universität zu Berlin, Germany  
"Polymerizing like the mussels do: Toward synthetic mussel-foot proteins and resistant high-performance glues"
- Heuts, Hans: Technische Universiteit, The Netherlands  
"Dynamic polyester networks via transesterification"
- Sumerlin, Brent: University of Florida, USA  
"Responsive materials from dynamic bonds"
- Benetti, Edmondo: ETH, Switzerland  
"Topological evolution of polymer brushes for designing advanced materials"
- Hutchings, Lian: Durham University, United Kingdom  
"Molecular engineering with anionic polymerization"
- Anastasaki, Athina: ETH, Laboratory of Polymeric Materials, Switzerland  
"What happens in the dark? Assessing the temporal control of photo-mediated controlled radical polymerizations"
- Wilson, Paul: University of Warwick, United Kingdom  
"Precision synthesis and nanofabrication using nanoscale electrochemistry"
- Hourdet, Dominique: Sorbonné University, France  
"Responsive assemblies in aqueous media: From controlled rheology of polymer solutions to mechanical reinforcement of covalent hydrogels"
- Harrisson, Simon: University of Warwick, United Kingdom  
"Limits of precision monomer placement in chain polymerizations"
- Yagci, Yusuf: Istanbul Technical University, Turkey  
"Complex macromolecular architectures by photoinduced ATRP and its combinations with the other polymerization modes"
- Tuten, Bryan: Queensland University, Australia  
"Using macromolecular architecture to control photochemistry and photochemistry to control macromolecular architecture"

## Oral Contributions:

- Chertovich, Alexander: Moscow State University, Russia  
"In silico copolymerization of linear and network polymer systems"
- De Keer, Lies: Ghent University, Belgium  
"In silico visualization of segments in highly branched structures: The case of para-fluoro-thiol network ligation"
- Guégan, Philippe: Sorbonne Université, France  
"Track-etched polycarbonate membranes modified by polyalkyloxazolines to mimic nucleopore"
- Cairns, Stefan: Malvern Pananalytical Ltd, United Kingdom  
"Detection of single block impurities in AB block-copolymers by gel permeation chromatography and ultra-high performance liquid chromatography"
- Byard, Sarah (presented by Armes, Steven): University of Sheffield, United Kingdom  
"Unique aqueous self-assembly behavior of a new thermoresponsive diblock copolymer"
- De Smet, Lieselot: Ghent University, Belgium  
"Fabrication of smart colorimetric hard and soft materials by plasma dye coating"
- Firdaus, Shamila: Leibniz-Institute für Polymerforschung Dresden e.V. Germany  
"A comparative study of glycol-dendrimers and glycol-pseudodendrimers on basis of aliphatic polyesters"
- Mbizana, Siyasanga: University of Stellenbosch, South Africa  
"Poly (*N*-vinylpyrrolidone)-polypeptide based antitumor nanocarrier"
- North, Shannon: University of Sheffield, United Kingdom  
"Properties of poly(methacrylic acid)-block-poly(2-hydroxypropyl methacrylic) diblock copolymers and their use as dispersants for inkjet-grade carbon black"
- Champagne, Pascale: Queen's University, Canada  
"Carbon dioxide switchable polymers as draw agents for forward osmosis"
- Mellot, Gaëlle: Sorbonne Université, France  
"Nanofibers by PISA in water: Influence of the RAFT agent architecture and functionality on the self-assembly"
- Biais, Pauline: Sorbonne Université, France  
"Synthesis of loop-stabilized particles by PISA in water"
- Warren, Nicolas: University of Leeds, United Kingdom  
"Accelerating polymerization-induced self-assembly using continuous-flow reactors"
- Rieger, Jutta: Sorbonne Université, France  
"From amphiphilic block copolymers towards nanostructured materials by polymerization-induced self-assembly"
- Cornel, Erik: University of Sheffield, United Kingdom  
"In situ spectroscopic studies of highly transparent dispersions via RAFT PISA in non-polar media"

- Save, Maud: University of Pau & Pays Adour, France  
"Synthesis of photoactive polymer colloids by polymerization in aqueous dispersed media to product singlet oxygen"
- Szweda, Roza: Université de Strasbourg, France  
"Synthesis of coded Matter through layer-by-layer assembly of sequence-defined polymers"
- Derry, Matthew: University of Sheffield, United Kingdom  
"Thermoreversible crystallization-driven aggregation of diblock copolymer nanoparticles in mineral oil"
- Hunter, Saul: University of Sheffield, United Kingdom  
"Surfactant resistance of pickering emulsions stabilized by anisotropic diblock copolymer nanoparticles"
- Plüschke, Laura: Leibniz-Institut für Polymerforschung, Germany  
"Unlocking polyolefin topology – a scattering study by theory and experiment"
- Peikert, Paul: TU Darmstadt, Germany  
"Stochastic modelling of the branching structure of LDPE as well as its impact on polymer properties"
- Penfold, Nicholas: University of Sheffield, United Kingdom  
"Is hydroxyl functionality a prerequisite for inducing stasis in human pluripotent stem cell colonies immersed within block copolymer worm gels?"
- Kargaard, Anna: RCSI, Ireland  
"Polypeptide as therapeutics against antimicrobial-resistant pathogens"
- Thierfelder, Nikolaus: Ludwig-Maximilians University, Germany  
"Polymers meet medicine – 3D-printing in cardiovascular surgery"
- Siteo, Alcides: University of Pretoria, South Africa  
"Microporous polymer matrix as a slow release of insect repellent"
- Podevyn, Annelore: Ghent University, Belgium  
"Synthesis and characterization of photo-sensitive gelatin and poly(2-oxazoline) precursors towards hybrid hydrogel treatment"
- Williams, George: University of Bath, United Kingdom  
"Development of a peroxide responsive polymeric gel for the triggered release of multiple antimicrobial agents for the treatment of chronic wounds"
- Eigenseer, Julia: TU Darmstadt, Germany  
"Impact of short chain branches onto polymer properties on micro- and macro-scale"
- Boye, Susanne: Leibniz-Institute für Polymerforschung, Germany  
"AF4-LS characterization of biohybrid structures"
- Verjans, Jente: Ghent University, Belgium  
"Dynamic materials based on hydrogen bonded polymer networks"

- Gorelik, Boris: MOBIChem Scientific Engineering, Israel  
"Interpenetrating networks in photo-crosslinked polyolefins containing different acrylic monomers"
- Pfukwa, Rueben: University of Stellenbosch, South Africa  
"Poly(3-methylene-2-pyrrolidone)s: Extending the utility of pyrrolidone in polymer science"
- Deane, Oliver: University of Sheffield, United Kingdom  
"Synthesis of well-defined pyrrolidone-based homopolymers and stimulus-responsive diblock copolymers via RAFT aqueous solution polymerization of 2-(*N*-acryloyloxy)ethylpyrrolidone"
- Haven, Joris: Monash University, Australia  
"RAFT polymerization as a versatile approach for the design of discrete precision polymers"
- Edeleva, Mariya: Novosibirsk State University, Russia  
"In-situ activation of alkoxyamines by 1,3-dipolar cycloaddition for safe and efficient NMR"
- Rodriguez, Kyle: University of Fribourg, Switzerland  
"Tailor-made metalloenzymes for catalyzing controlled radical polymerizations"
- Kuzmyn, Andriy: Wageningen University, The Netherlands  
"Micro-patterened hierarchical bioactive polymer brushes by visible light-induced surface-initiated LRP"

An Elsevier Workshop was presented by Christiane Barranguet, Elsevier, The Netherlands, entitled "How to produce an international publication: Getting published & Promoting your work".

The following organizations either sponsored us (financial or in kind) or were exhibitors:

- IUPAC: (Sponsorship in kind) Richard Hartshorn, Secretary General  
IUPAC Secretariat, PO Box 13737, Research Triangle Park, NC 27709 USA
- Kansai Plascon: (Sponsor) Reda Fleet  
P/a University of Stellenbosch, Polymer Science Building, Stellenbosch 7600 South Africa
- University of Stellenbosch: (Sponsor) Prof Eugene Cloete  
Vice-Rector: Research, Innovation and Postgraduate studies, Stellenbosch, South Africa
- Perkin Elmer: (Exhibitor) Chris de Jager, Nicolas Lancaster, Helen Roux  
PO Box 7058, Greenstone 1616 South Africa
- Microsep: (Exhibitor) Marius Pretorius, Wena Janse van Rensburg, Desiree Lahoud  
PO Box 391647, Bramley 2018 South Africa
- Separation Scientific: (Exhibitor) Frankie Rugnut, Euan Cyster, Triolan Pillay  
Cnr Beyers Naude and Blueberry Street, Johannesburg 2040 South Africa
- Taylor & Francis: (Exhibitor/Sponsor) Deidre Mvula, Mokhesenb Buti, Hazel Dickens  
Milton Park, United Kingdom
- European Polymer Journal, Elsevier: (Exhibitor) Leanne Mullen  
Oxford, United Kingdom
- Bruker: (Exhibitor) Pari Antalis, Godfrey Lekhlani  
PO Box 1091, Cramerview 2060 South Africa
- Wiley-VCH Macromolecular Journals: (Sponsor) Kirsten Severing  
Weinheim 69469 Germany



- Royal Society of Chemistry: (Sponsor) Laura Fisher  
Thomas Graham House, Cambridge, United Kingdom
- ACS Publications: Biomacromolecules, ACS Macro Letters, Macromolecules:  
Sponsor Molly Ferns, Allison Curis  
ACS Publications, Washington, USA

The Conference Banquet was held at Spier Wine Farm. The Language of Being Jazz Band (Terry Bell) 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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