# POLYCHAR 23 World Forum Advanced Materials

**by Michael Hess**

The 23rd World Forum on Advanced Materials (POLYCHAR) (derived from Polymer Characterization) returned to the United States for the first time since 2003, when this Conference began changing venues annually. Previously, it had been hosted by the University of North Texas for the 11 years from its founding in 1992 by Witold Brostow, Michael Hess, and Kevin Menard. In the year 2015 POLYCHAR was hosted by the University of Nebraska, Lincoln (UNL), USA, and organized by a local organization committee (the Department of Mechanical & Materials Engineering and the College of Engineering) and an international organization committee with members from Belgium, France, South Korea, and Nepal, chaired by Prof. Mehrdad Neghaban (UNL). The conference was supported by IUPAC, the IUPAC Polymer Division (Samsung Fund), the American National Science Foundation, the University of Lincoln (UNL), the Office for Research and Educational Development (UNL), the College of Engineering (UNL), the Department of Mechanical & Materials Engineering (UNL), the City of Lincoln Convention and Visitors Bureau, and the John A. Woollam Company.

Previous conferences have been held in Denton, Texas; Guimaraes, Portugal (2004); Singapore (2005); Nara, Japan (2006); Buzios, Brazil (2007); Lucknow, India (2008); Rouen, France (2009); Siegen, Germany (2010); Kathmandu, Nepal (2011); Dubrovnik, Croatia (2012); Gwangju, South Korea (2013); and Stellenbosch, South Africa (2014).

In 2015, there were six Plenary Lectures (two Young Scientists Plenaries), the Flory Medal Talk, and 13 individual Sessions in two parallel events:

- Characterization Methods and Structure-Properties Relations (15 contributions) Keynote: Jean-Michel Guenet (France), *Characterization and Properties of Hybrid Materials from Polymers and Self-Assembled Systems*
- Predictive Methods, Modelling and Simulation (11) Keynote: Jean-Marc Saiter (France), *Physical Aging and Cooperative Relaxation in Glassy Polymers*
- Biomaterials, Drug Delivery and Tissue Engineering Materials - Green Polymers, Green Engineering and Recycling (11) Keynote: Valerio Causin (Italy), *Nanocellulose-Reinforced Gels for Biomedical Applications*; Victor Castano (México), *Advanced Natural Materials: From Rice Husk to Aerospace Systems*
- Fibers, Interfaces and Composite (6)
- Nanomaterials and Smart Materials (10) Keynote: Yuri Dzenis (USA), *Simultaneous Strong and Tough Continuous Polymer Nanofibres and Nanocomposites*
- Dielectric-, Electrical-, Magnetic-, Optical- and Optoelectronic Properties (8)
- Polymers in Electronics and Optoelectronic Devices (5)
- Progress in Polymer Synthesis (5) Keynote: Daniel Grande (France), *Design, Synthesis, and Characterization of Functional Doubly Porous Crosslinked Polymers*; Betty López (Colombia), *A New Method to Modify Poly(arylene ethers) with a Mild Sulfonating Agent*
- Characterization with Scanning Probe Microscopy (4) Keynote: Dalia Yablon (USA), *Advances in Atomic Force Microscopy Based Methods to Characterize Polymer Materials on the Nanoscale*
- Rheology, Solutions and Processing - Mechanical Properties and Performance (5)
- Processing and and Properties of Semicrystalline Polymers (6) Keynote: Jean-Marc Lefebvre (France), *In-Situ SAXS/WAXS Investigation on Deformation Induced Structural Evolutions in Amorphous and Semi-Crystalline Polymers*; Andrezej Galeski (Poland), *Crystallization and Melting Phenomena in Nanofibers Reinforced Polymer Nanocomposites*

These Sessions included 87 oral contributions (including 10 keynote speakers and 14 invited speakers), and 45 Posters in one session, with 103 registered participants (including 42 students) from 21 countries and 5 continents. In addition to the US, there were participants from France, Belgium, Nepal, Singapore, Poland, South Korea, Germany, Japan, China, Malaysia, Austria, Portugal, Canada, India, Georgia, Colombia, China (Taiwan), Mexico, and Ireland.

As indicated by the list of Sessions above, the topics were broadly distributed, with a focus on Characterization & Structure-Properties, Bio-related Materials/Applications, and Smart Materials.

The six Plenary Speakers were:

**Gila Stein** (Young Scientsts' Plenary), University of Houston, USA: *Grazing Incidence Small-Angle X-Ray Scattering: Principles, Models, and Application for Nanostructured Thin Films*

**Abby Whittington** (Young Scientsts' Plenary), Virginia

Tech: *Polymer Characterization of Medical Devices for Use in Cancer Patients*

**Harald Ade**, North Carolina State University, USA: *Soft X-Ray Characterization Methods: Utility and Opportunity*

**Stephen Cheng**, University of Akron: *Giant Polyhedra and Giant Surfactants Based on Nano-Atoms: Tuning from Crystals, to Quasicrystals, to Frank-Casper Phases: An Interconnection Between Soft and Hard Matter*

**Richard Laine**, University of Michigan, USA: *Synthesis, Processing and Properties of Silesquioxane Macromonomers and Polymers*

**Rachel Seligman**, University of California, Santa Barbara: *Using Bioinspired Polymers to Explore the Role of Sequence on Controlling Polymer Properties*

There was an additional talk on Recent Developments in the IUPAC Polymer Division by Michael Hess, informing participants about the general work and the educational aspects of the work of the Division. The full program can be found at: http://polychar23.unl.edu/downloads/Sessions_Program.pdf

The Short Course consisted of nine contributions (each including a 50 min + discussion):

- Dynamic-Mechanical Analysis (Michael Hess, University of North Texas, USA)
- Rheology & Processing (Dirk Schubert, University Nuermberg-Erlangen, Germany)
- Characterization of Polymeric Nanostructures with Combined Scanning Probe and Fluorescent Microscopy (Holger Schoenherr, University Siegen, Germany)
- Glasstransition and Glasstransition Temperature (Jean-Marc Saiter, Universite de Rouen, France)
- Micromechanics of Polymers: Micro- and Nanoscopic Processes of Deformation and Fracture (Sven Henning, Fraunhofer Institute for Mechanics of Materials, Halle, Germany)
- Solid State NMR (Bernhard Bluemich, University Aachen RWTH, Germany)
- Basics of Scattering Techniques: X-Ray, Neutron, Light (Jean-Michel Guenet, Institute Charles Sadron and Universite Strasbourg, France)
- Photochemistry in Polymer Science (Brett Fors, Cornell University, USA)
- Friction, Wear and Scratch Resistance of Polymers (Natalie Hnatchuk, University of North Texas, USA)

Short Course lecturers were available for further discussion throughout the Conference. There were about 47 Short Course participants—mostly, but not exclusively, students.

The Conference was opened by the Conference Chair, Mehrdad Neghaban (UNL), followed by welcome addresses by the Vice-Chancellor for Research & Economic Develoment at UNL, Prem Paul; the Chair of the Department of Mechanics & Materials Engineering, Jeff Shield; the Dean of the College of Engineering, Tim Wei; and Michael Hess, IUPAC Polymer Division (University of North Texas).

The prestigious Paul J. Flory Research Prize 2015 went to **Kohji Tashiro**, Toyota Technological Institute, Japan, for his Clarification of Microscopically-Viewed Structure-Property Relationship of Polymer Materials.

The International Materials Research Prize was given (ex aequo) to **Valerio Causin**, University of Padua, Italy, for his contribution to the structural and morphological characterization of materials by small-angle X-ray scattering, wide-angle X-ray dif fraction, thermal analysis, optical and electronic microscopy, and his contribution to polymer analysis in forensics; and to **Victor Castano**, Universidad Nacional Autónoma de México, México City México. Victor Castano founded the Center of Applied Physics and Advanced Technology of the National University of Mexico and created a number of new materials for diverse applications, including medical as well as water treatment technologies.

The IUPAC Poster Prizes were given to:

**Evan Schwahn**, UNL Mechanical and Materials Engineering Department, USA: *Controlled Curing of*

*Acrylate: System Modelling and Application in Stereolithography;*
**Franz Lanyi**, University Erlangen-Nuremberg Institute of Polymer Materials, Germany: *Novel Chart For Representation of Material Performance and Reliability;*
**Taylor Stockdale**, UNL, Mechanical and Materials Engineering Department, USA: *Manufactoring of Polyimide Fibre-Reinforced Nanocomposites*

The Bruce Hartmann Prize for Young Scientists went to: **Brett Fors**, Department of Chemistry and Chemical Biology, Cornell University, Ithaca, USA: *Deterministic Control of Polymer Molecular Weight Distribution*

The Jürgen Springer Prize for Young Scientists went to: **Carolina Gonçalves**, Faculty of Engineering, University of Porto, Portugal: *Xanthan Gum and Chitosan as Natural Adhesives for Cork*

Three Carl Klason Student Awards went to:
**Yoga Salim**, Department of Chemistry, Faculty of Applied Sciences, Universiti Malaya, Kuala Lumpur, Malaysia: *Thermal Degradation in the Melt Reaction between Poly(3-hydroxybutyrate-co-3-hydroxy hexanoate) and Epoxidized Natural Rubber;*
**Kaspars Maleckis**, UNL Mechanical and Materials Engineering Department, USA: *Ultrahigh-Performance Nanofibres from DNA and Proteins;*
**Hao Liu**, Department of Polymer Science, University of Akron, USA: *Two-Dimensional Nano-Crystals of Molecular Janus Particles*

Diplomas of Distinction went to:
**Taria Jamil**, Polymer Engineering Department, University of Akron, USA: *Mechanism of Molecular Interaction of Superplasticizer Oligomers with Hydrated Cement Phases;*
**Xue Li**, Chemistry University of Alberta, Canada: *Polymer-Based Materials for Building Artificial Muscles and Three Dimensional Structures by Self-Rolling;*
**Yaping Ding**, University Erlangen-Nuremberg Institute of Polymer Materials, Germany: *Electrospun PHB/PCL/Fumed Silica Fibrous Structure for Bone Tissue Engineering;*
**Wenglong Li**, UNL Mechanical and Materials Engineering Department, USA: *Characterization of the influence of depth in photo curing of acrylate: a method based on rapid-scan FTIR during laser curing on an ATR;*
**Simon Schönherr**, Graphene-Based Nanotechnology, University Siegen, Germany: *Investigation of Electronic Properties of a Graphene Field Effect Transistor*

Limited funds were granted by IUPAC for the support of graduate students and young scientists from underprivileged countries. However, due to high expectations by the applicants and visa problems, it was only possible to support one young scientist in the end:
**Bishnu Prasad Neupane**, School of Health and Allied Sciences, Pokhara University, Nepal: *Conversion of Waste Paper into Bioplastics—Poly(lactic acid)*

Mehrdad Neghaban, his colleagues, and collaborators at the University of Nebraska, Lincoln, deserve our thanks for their effective organization of the Course and the Conference. Good organization is a necessary condition for a creative and comfortable atmosphere, which was appreciated by the participants in Lincoln.

POLYCHAR 24 is scheduled for Poznan, Poland, end of April/early May 2016, POLYCHAR 25 is planned in Kuala Lumpur, Malaysia, 2017.

## Science Assessments and Research Integrity: Reconcilable or Antagonistic?

At the recent **4th World Conference on Research Integrity** (31 May—3 June 2015, Rio de Janeiro, Brazil, www.wcri2015.org), attended by around 500 participants from more than 50 countries on five continents, the ICSU Committee on Freedom and Responsibility in the conduct of Science (CFRS) organised a symposium on "Research assessment and quality in science."

Speakers with different perspectives, from higher education to government and policy, with a national context and including young scientists, explored the implications of science assessments [1]. The goal of the symposium was to generate discussion on how to shape assessments to facilitate scientific work of high integrity for the benefit of society. This reflected a context that **Lex Bouter**, Professor of Methodology and Integrity at the Free University of Amsterdam in the Netherlands, characterised in his keynote as "hypercompetition" for positions, funding, and resources as a