Educational Workshop in Polymer Sciences 2020

in conjunction with MACRO2020, Jeju Island

Theme: **Polymers for applications**

Date: **Sunday, 5 July 2020**

Time: **1.00 pm to 5.00 pm**

International Convention Center, Jeju Island, Korea

Synopsis

This interactive educational workshop on polymers for applications is suited for postgraduates or researchers from all countries to up-date their knowledge by interactive oral lectures. All the 3 lectures shall touch on the understanding of the basic science, terms and concepts that are critical to polymers for applications from designing the polymers for industrial applications. Thought-provoking insights into the optimization of molecular structures in relation to the properties and the potential / commercial applications will be presented. This will provide a basis also for understanding research reports during the following days of the conference. Before the workshop, the instructors may share their power point slides on the website of the IUPAC sub-committee on Polymer Education accessible to the general public.

Who should attend

Postgraduates, higher level undergraduates and other researchers in polymer processing in relevant manufacturing industries.

Fee for Educational Workshop in Polymer Sciences 2020

1. Complimentary for the participants of MACRO2020 **OR**
2. USD150 (International) or KRW150,000 for solely attending Educational Workshop on Polymers for Applications

Payment mode

Please refer to this web link
http:// www.macro2020.org

Tentative program

The educational workshop is a set of lectures by experts in the field describing different aspects of interest to the participants of MACRO2020. The following topics will be presented.

Time	Lecture	Speaker
1.00 pm	Registration	
1.25 pm – 1.30 pm	Welcoming speech by the Co-chair of IUPAC Project under Polymer Education Subcommittee	
1.30 pm – 2.30 pm	"Polymers for applications" – The long way from an idea and work in the academic lab towards a product	Prof. Dr. Holger Schönherr Click ***here*** for lecture notes
2.30 pm – 3.30 pm	Polymers for future electronics	Prof. Dr. Myung-Han Yoon Click ***here*** for lecture notes
3.30 pm – 3.45 pm	Short break	
3.45 pm – 4.45 pm	Engineering of polymer nanoparticle morphology for paint applications	Prof. Dr. Per Zetterlund Click ***here*** for lecture notes
4.45 pm – 4.50 pm	Closing of workshop by Chairman of IUPAC Polymer Education Sub Committee	
4.00 pm	Grand opening and plenary lectures of MACRO2020	

For more information, please contact

Organization Secretariat

The 48th World Polymer Congress
IUPAC-MACRO2020

MACRO2020 Secretariat
E-mail: secretariat@macro2020.org
Tel: +82-2-765-7996
Fax: +82-303-3441-7996
Website: http://macro2020.org

MACRO2020 Organizer
Trinity Communications. Co., Ltd
E-mail: comms.trinity@gmail.com
Website: www.trinitycomms.kr

IUPAC
International Union of Pure and Applied Chemistry

under the auspices of
International Union of Pure and Applied Chemistry

MORE with IUPAC Polymer Education

Abstracts

Prof. Dr. Holger Schönherr
schoenherr@chemie.uni-siegen.de
The design, synthesis, and modification of polymers and the investigation of key properties that seem relevant for applications place "Polymers for Applications" for many, if not even most academic research projects in the focus. A good example are polymers for biomedical applications, which may address clearly identified medical and thereby societal needs and therefore are thought to possess considerable impact. In this context one may name, for instance, polymer-based implant materials, materials for controlled release of potent drugs or materials that assist and speed up wound healing.

In this presentation the long road from academic research towards an actual product will be sketched on the basis of work from our own laboratory as well as those of colleagues. Using typical examples, the challenges that all the way from initial polymer design, synthesis *via* proof of concept to finally application-oriented research and development to application will be discussed.

The examples will include the enhancement of the function of conventional wound dressings by implementing advanced functionalities, including antibacterial / antimicrobial as well as diagnostic functions. Such active wound dressings may become important in the area of chronic wound treatment, where bacterial infection impairs the natural wound healing. Thus chronic wounds fail to heal and produce anatomic and functional integrity due to the severe impairment of several healing processes.

In addition, novel cell culture materials and advanced functionality *via* designed biointerfaces will be highlighted. From the experiments in the academic laboratory *via* proof of concept we will walk together towards application and reflect on various important steps along this long journey, including, but not limited to, protection of intellectual property rights (IPR), scale up, production according to GMP (good manufacturing practice), as well as unavoidable regulatory issues.

Prof. Dr. Myung-Han Yoon
mhyoon@gist.ac.kr
Over the last 100 years, polymeric materials found an extremely broad range of applications such as textiles, everyday commodity, automotives, aircrafts, biomedical devices, displays, electronics, *etc*. In the case of traditional electronic applications, a variety of special polymeric materials have been developed for plastic circuit board (PCB), photoresist (PR), packaging, which take advantage of favorable processability and electrical/thermal insulating characteristic. In this educational lecture, we will cover several topics related to 'Polymers for Future Electronics', where electrical/ionic conductivities are actively employed. The basic structure *vs.* property relation, molecular design principles, and possible industrial applications of conjugated or ionic polymers will be presented. While the related fundamental knowledge will be delivered, the potential applications to future electronics will be depicted by showing the realistic demonstration reported in the recent literature.

Prof. Dr. Per Zetterlund
p.zetterlund@unsw.edu.au
Polymer nanoparticles find applications in a wide range of fields ranging from traditional areas such as paints and coatings to more recent applications such as nanomedicine as exemplified by drug delivery. In order to tune the properties of polymer nanoparticles as well as the resulting material in the case of for example film formation, it can be crucial to control both particle morphology (internal and external) as well as particle shape. This lecture will focus on these aspects of polymer nanoparticle synthesis, with special attention given to aqueous emulsion polymerization based techniques. Many paints and coatings applications are based on waterborne latexes produced by emulsion polymerization. Over the last decades, industry has pushed forward to develop novel specialty latexes to improve film

properties and to remove volatile organic solvents. Gradient particles are nano-sized polymer particles where the composition of the polymer continuously varies as a function of the radius from the centre of the particle. The synthesis and characterization of such particles, from a viewpoint of film formation, will be described. Furthermore, the concept of nano-engineering of polymer nanoparticle morphology via aqueous emulsion polymerization will also be briefly described by exploiting the ability to covalently link numerous polymer blocks that are chemically incompatible using reversible addition-fragmentation chain transfer (RAFT) polymerization, resulting in microphase separation and formation of a well-defined multilayered structure within the nanoparticles.

Instructors' profile

Prof. Dr. Holger Schönherr studied chemistry and polymer chemistry & physics at the Universities of Mainz and Toronto and obtained his Ph.D. at the University of Twente, The Netherlands. Following a postdoctoral stay at Stanford University, he joined MESA+ Institute for Nanotechnology in Twente as tenured assistant professor (later promoted to associate professor), before joining the University of Siegen as University Professor in Physical Chemistry. His research interests comprise the modification and characterization of polymeric surfaces and (bio)interfaces, micro- and nanostructured polymeric materials, bacteria detection, 3D cell culture and surface analysis with atomic force microscopy (AFM) and combined AFM-optical methods.

Prof. Dr. Myung-Han Yoon received his Ph.D. in Materials/Inorganic Chemistry at Northwestern University in US. Then, he moved to Department of Chemistry and Chemical Biology at Harvard University as a postdoctoral fellow and focused on neuronal electronic interfaces. He joined School of Materials Science and Engineering, Gwangju Institute of Science and Technology (GIST) as a junior faculty member in 2010, and became promoted to an associate professor in 2015 and a full professor in 2018. He has been an advisory professor at LG Electronics since 2016. His research interest is "Developing Conjugated Polymers, Sol-Gel Metal Oxides, Fibrillar Hydrogel for Printable Flexible Electronics and Bio-Electronic Interfaces".

Prof. Dr. Per Zetterlund graduated from The Royal Institute of Technology in Stockholm (KTH, Sweden) in 1994, obtained his Ph.D. at Leeds University (UK) in 1998, and subsequently conducted postdoctoral research at Griffith University (Brisbane, Australia). In 1999, he became Assistant Professor at Osaka City University (Japan) in the group of Prof. Yamada, and moved to Kobe University (Japan) in 2003 to join the team of Prof. Okubo, where he was promoted to Associate Prof in 2005. Since 2009, he is working at The Centre for Advanced Macromolecular Design (CAMD) at The University of New South Wales (Sydney, Australia), where he is currently full Professor and co-Director of the Centre. Prof Zetterlund's research is concerned with the synthesis of polymer, polymeric nanoparticles, as well as hybrid polymeric materials with a variety of applications ranging from materials science to nanomedicine. He has published ~200 peer-reviewed papers.