

Your Basic Polymer Sciences with the Subcommittee on Polymer Education: From Synthesis to Application!

International conferences, in bringing researchers from different backgrounds and different levels of access to opportunities together, are ideal venues for educational activities to improve the practice of science, particularly in the emerging nations.

Educational Workshop in Polymer Sciences 2016 in conjunction with MAC-RO2016, Istanbul

Polymer synthesis



Educational Workshop in Polymer Sciences 2018 in conjunction with MAC-RO2018, Cairns

Polymer processing



25th Short Course on Polymer Characterization in conjunction with 25th POLYCHAR 2017, Kuala Lumpur

Polymer characterization



Educational Workshop in Polymer Sciences 2020+ in conjunction with MAC-RO2020+, Jeju

Applications of polymers

The Sub Committee on Polymer Education (SCPE) has organized a social series of workshops about Education in Polymer Chemistry on several occasions.

This series of interactive IUPAC Education Workshops in Polymer Sciences (2016, 2017, 2018 and 2020+) on polymer sciences are intended primarily for students or active researchers from emerging countries. The presentation slides from the instructors are accessible from IUPAC project webpages through the QR-codes given below:

The Subcommittee on Polymer Education under IUPAC Polymer Division and IUPAC Committee on Chemistry Education (CCE) wanted to publish the lecture notes of the series workshop as well as the educational materials in polymer sciences in a special issue of *Chemistry Teacher International*.

One of the goals of *Chemistry Teacher International* is to bridge the gap between research and education. Good practices and the basics for some topics in polymer sciences for educational purpose should be helpful educational materials for the teachers or lecturers. In this recently released special issue, three articles on polymer synthesis, five articles on polymer characterization, two articles on polymer processing and three articles on polymer applications are published.

Both SCPE and CCE

Interactive Educational Workshop in Polymer Sciences



Basic science, terms and concepts for experimental design, data interpretation....

Your basic polymer sciences with IUPAC
From synthesis to applications!

Lecture notes are **OPEN ACCESS**

2016: Polymer synthesis

Prof. Dr. Devon A. Shipp, University of Melbourne, Australia

Radical polymerizations – chain growth basics & special cases

Dr. Peter Kilz, PSS Polymer Standard Service, Germany

Size-exclusion chromatography as a useful tool for the assessment of polymer quality and determination of macromolecular properties

Dr. Graeme Moad, CSIRO, Australia

Radical Addition-Fragmentation and RAFT polymerization



2017: Polymer characterization

Assoc. Prof. Dr. Chin Han Chan, Universiti Teknologi MARA, Malaysia

Electrochemical characterization of polymer electrolytes

Emeritus Prof. Dr. Jean-Marc Salter,

Onyx, Groupe Nutriset Company and University of Rouen, France

Thermal analysis used to analyze the glass transition phenomenon

Prof. Dr. Michael Hess, University of North Texas, US

Viscoelastic properties of polymers
Simple teaching for mathematical treatments about diffraction and scattering of X-ray and visible light beams

Prof. Dr. Volker Abetz, University of Hamburg and Helmholtz-Zentrum Geesthacht Centre for Materials and Coastal Research, Germany

Determination of thermodynamic quantities by scattering techniques
Prof. Dr. Witold Brostow, University of North Texas, US

Polymer tribology

Dr. Sven Henning,

Fraunhofer Institute for Microstructure of Materials and Systems, Germany

Micromechanics of polymers: Electron microscopic methods of investigation

Dr. Aik Hwee Eng, Freelance, Malaysia

Characterization of crosslinks in vulcanised rubbers: From simple to advanced techniques

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2018: Polymer processing

Prof. Dr. Volker Abetz, University of Hamburg

and Helmholtz-Zentrum Geesthacht Centre for Materials and Coastal Research, Germany

Fabrication of polymer membranes

Prof. Dr. Andrij Pich, RWTH Aachen University, Germany

Aqueous microgels: From tailored synthesis to fabrication of multifunctional materials

Prof. Dr. Peter Halley, University of Queensland, Australia

Polymer processing: Process considerations and optimization for biobased and green polymers

2020+: Polymer applications

Prof. Dr. Holger Schönherr, University of Siegen, Germany

"Polymers for applications" – The long way from an idea and work in the academic lab towards a product

Prof. Dr. Myung-Han Yoon, Gwangju Institute of Sciences and Technology, Korea

Polymers for future electronics

Prof. Dr. Per Zetterlund, The University of New South Wales, Australia

Engineering of polymer nanoparticle morphology for paint applications

acknowledge the work done by the instructors and the contributors of the articles for the benefits of the young researchers and teachers.

This special issue is available through the website of the Open Access Journal *Chemistry Teacher International*: <https://www.degruyter.com/journal/key/CTI/html>

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<https://iupac.org/project/2019-035-1-050>

Systems Thinking in Chemistry for Sustainability

“Earth Day 2021—April 22—with the theme of ‘Restore Our Earth,’ along with Chemists Celebrate Earth Week 2021 from ACS with the theme ‘Reducing Our Footprint with Chemistry,’ provides a rich opportunity to reflect on the extent to which we integrate sustainability into chemistry education.”

This is exactly what Peter Mahaffy and colleagues from the IUPAC task group 2020-014-3-050 on “Systems Thinking in Chemistry for Sustainability: Toward 2030 and Beyond (STCS 2030+)” did in a guest editorial published in the *Journal of Chemical Education*, titled “Integrating Sustainability into

Learning in Chemistry.” [1]

“This editorial highlights how the interdisciplinary work of integrating sustainability into chemistry education can be guided by systems thinking, and by the United Nations Sustainable Development Goals and Planetary Boundaries frameworks. Such systematic approaches can energize educators and learners to situate chemistry within a broader landscape of knowledge and thus tap chemistry’s potential to enhance sustainability.”

The authors highlight the importance of transforming chemistry education so that it can play a meaningful role in achieving a sustainable future for our planet and its people. By applying systems thinking, the IUPAC STCS 2030+ project working group is highlighting the centrality of chemistry as a sustainability science and developing systems-thinking-oriented activities and approaches that integrate sustainability frameworks into chemistry education. One focus of the working group is to contribute to the goals of the International Year of Basic Sciences for Sustainable Development, IYBSSD-2022, www.iybssd2022.org. (see more page 40)

References

1. Jane E. Wissinger, Aurelia Visa, Bipul B. Saha, Stephen A. Matlin, Peter G. Mahaffy, Klaus Kümmerer, and Sarah Cornell, *Journal of Chemical Education* **2021**, 98, 4, 1061-1063 (Editorial); <https://pubs.acs.org/doi/10.1021/acs.jchemed.1c00284> (online, 14 April 2021)

Related IUPAC projects

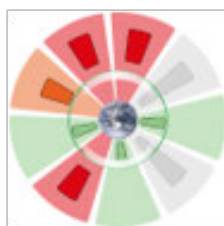
<https://iupac.org/project/2020-014-3-050>

Global Sustainability Frameworks

UN Sustainable Development Goals



Planetary Boundaries



Chemistry Education

Green chemistry
Sustainable chemistry

Systems thinking in chemistry

Transformed chemistry research and practice

Chemistry for Sustainability