REGISTRATION INFORMATION

Registration will take place electronically at: **https://uwaterloo.ca/institute-polymer-research/events**

For further information, see also our website (check under "Events") at:

uwaterloo.ca/institute-polymer-research

WHO SHOULD ATTEND?

Engineers and chemists involved with polymerization, polymer production technology, polymerization kinetics, process engineering, product characterization, modeling, product/process improvement, design of polymerization experiments, data analysis and handling.

Everyone will benefit from learning problem-solving techniques and tips for troubleshooting polymerization behaviour. The lecturers combine 50 years of accumulated experience in polymer process/product development and polymerization technology.

All topics are highly practical and have been tested and re-evaluated repeatedly over the last 30 years and during numerous industrial in-house courses.

YOU MUST MAKE YOUR OWN HOTEL RESERVATIONS

A block of rooms at the Delta hotel has been set aside (until May 13, 2017) for course participants. A special rate has been secured so when contacting the Delta Hotel, please indicate that you are attending the Institute for Polymer Research course.

The Delta is located at:
110 Erb Street West Waterloo, Ontario
519-514-0404

TRANSPORTATION/OTHER DETAILS

For ground transportation or any other details regarding your visit to Waterloo, please contact the Conference Coordinator:

Colleen Mechler, Tel: 519-888-4789
Fax: 519-746-4979, Email:
ipr@uwaterloo.ca

IN-HOUSE COURSES

The Institute for Polymer Research at the University of Waterloo has more than 30 years' experience in conducting in-house courses specifically tailored to your needs and requirements. Secrecy agreements could be signed permitting the consideration of more sensitive material.

Further information on this course or other courses may be obtained from:

Professor J. Duhamel, IPR Director
Institute for Polymer Research
University of Waterloo
Waterloo, Ontario, Canada N2L 3G1
Tel: 519/888-4767, ext. 35916
Fax: 519/747-0435
Email: jduhamel@uwaterloo.ca

35th North American Intensive Short Course

Characterization & Optimization of Polymer Properties

Polymerization, Polymer Modification, and the Different Polymeric States

Directed by:

Professor Alex Penlidis , FCAE, FCIC, PEng
Department of Chemical Engineering
University of Waterloo

Professor Jean Duhamel, PEng
Director of the Institute for Polymer Research
Department of Chemistry
University of Waterloo

Hosted by:
Institute for Polymer Research
University of Waterloo

To be held at:
University of Waterloo
Waterloo, ON, Canada

JUNE 19 – 21, 2017

The course will include a basic introduction on polymer science and engineering, a review of the main polymerization techniques and optimal process operation, and the characterization of the three polymer states, namely glassy, rubbery, and crystalline. Participants can discuss their own examples and interact with the lecturers. One of the lecturers, Prof. Penlidis, has organized courses for more than 30 years involving more than 1000 industrial participants representing more than 60 companies worldwide. The examples used represent the state-of-the-art.

COURSE FEES

The cost per person is US$1,500. The course fee includes registration, course notes, beverage breaks, drinks on Monday, June 19th, and dinner on Tuesday, June 20th at the University Club. Special discounts exist if two or more participants from the same company register for the course. Upon receipt of intent to register, further information will be sent regarding payment options.

COURSE NOTES

The course notes have recently been updated and expanded and are included in the cost of registration. Copies are available for purchase by non-participants for US$500, after the course. Notes will be given to participants just before lectures start.

LOCATION

University of Waterloo
200 University Avenue West
Waterloo, ON Canada N2L 3G1
Tel: 519-884-0220, Fax: 519-884-0321
Toll-free: 800-361-4708

TROUBLESHOOTING POLYMERIZATIONS PROGRAMME

Session 1 Monday, June 19 (9:00 am - 12:30pm) (JD)
Representation of chain length and molecular weight distributions and their characterization using gel permeation chromatography (application to chain branching), static (Zimm plot) and dynamic (hydrodynamic radius) light scattering, and intrinsic viscosity.

Session 2 Monday, June 19 (2:00 - 5:00pm) (JD)
The crystalline state of polymers, characterization by differential scanning calorimetry (DSC), temperature rising elution (TREF), and crystallization analysis fractionation (CRYSTAF), definition of lamellae and spherulites, crystal growth rate, effect of copolymer composition, Avrami's model.

Session 3 Tuesday, June 20 (8:30 am - 12:30 pm) (AP)
Introduction to chain growth polymerization mechanisms and kinetics (radical/ionic); linear, branched, and crosslinked chains; rate expressions; molecular weight and long-chain branching expressions; instantaneous property methods.

Session 4 Tuesday, June 20 (2:00 - 5:00 pm) (AP)
Extensions to copolymerizations and multicomponent polymerizations; examples of troubleshooting with typical polymerization data; analysis of data and learning from process observations; examples from copolymerization; reactivity ratio estimation techniques; single and multiple responses; examples from terpolymerization; uses of mathematic models.

Session 5 Wednesday, June 21 (9:00 am - 12:00 pm) (JD)
Introduction to the glassy state and the importance of free volume; tools used to probe the glass transition temperature (tensile test (Instron) and rheometer); the time-temperature correspondence principle and the Williams-Landau-Ferry (WLF) relationship; effect of chemical structure, molecular weight, crosslinking, crystallinity and copolymer composition on the glass transition temperature

Session 6 Wednesday, June 21 (2:00 am - 5:00 pm) (JD)
Linear and non-linear viscoelasticity of polymer samples, mechanical models used to represent viscoelastic behavior, types of experiments (creep and recovery, stress relaxation, tensile test), characterization with the storage (G') and loss (G'') moduli, effect of plasticizer, chain length, and crystallinity on modulus-versus-temperature plots; capillary rheometry to probe non-linear viscoelasticity.