10th Polyolefin Reaction Engineering Course

An Industrial Short Course on Olefin Polymerization Processes

Lyon, France

19-22 November 2018

Course Outline

www.polyolefins.org

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Chemistry, Catalysis, Polymers and Processes

Villeurbanne, France

Course Description

This course is designed for engineers, chemists, and scientists working in olefin polymerization with coordination catalysts, polyolefin physical properties and microstructural characterization.

All sessions include case studies where the concepts covered in the lectures are applied to real situations in laboratory and industrial scales. The lectures are designed in such a way that both beginners and specialists can benefit from the course.

An electronic copy of the course notes and of the PRE educational software developed by the instructors to illustrate the subjects covered in the course is provided to each participant. We encourage the participants to bring their laptop computers, so they can follow the notes and use the PRE educational software during the lectures.

Instructors

Professor João B.P. Soares is a specialist in the areas of olefin polymerization kinetics and catalysis, mathematical modeling of olefin polymerization processes and polyolefin microstructural characterization.

Dr Timothy McKenna is a specialist in the area of polyolefin particle morphology and experimental methods for the evaluation of particle morphology, single particle modeling, and the production of impact copolymers.

Dr Christophe Boisson is a expert in the field of catalyst design for olefin polymerization, and in particular in the field of single site catalysts for commodity and specialist applications.

Dr Paul Deslauriers is currently R&T Research Fellow (Emeritus) at CP Chem (ex Chevron Phillips). He is a world reknowned expert in the field of polymer characterisation and chemiometrics.

Registration

Registration forms and relevant information are available at *www.polyolefins.org* or by contacting us at *tflmckenna@gmail.com*

The course fee is 4300 CAD$ (equivalent to 2800 € or 3250 USD$) for industrial participants, 1900 CAD$ (1250 € or 1500 USD$) for students. Special discounts exist for two or more participants from the same institution. Please contact Timothy McKenna at *tflmckenna@gmail.com* for more information.

The course fee includes course registration, an electronic copy of the course notes (pdf), the educational software and coffee breaks. Please note that

Location

The course will be held at the *Résidence Villemanzy* in the centre of Lyon.

Registered participants can benefit from a reduced room rate upon request.

The PRE Course Series

The PRE course was designed to fill the need in the industry and academia for graduate-level training on polyolefin reaction engineering, characterization and physical properties. This is the 9th public course of the series. Previous public courses have been run in Lyon (FR), Porto Alegre (BR), Dubai (UAE), and Houston (USA).

In addition, we run 3-day and 5-day in-house courses, with previous such events being held in Saudi Arabia, Colombia, Holland, Spain, the United States and Austria.

For more information on the PRE Course Series, please visit our website at www.polyolefins.org

Course Contents

Introduction to Polyolefins
- Polyolefin types
- Polymerization reactor types

Catalysts for Olefin Polymerization
- Review of catalyst and cocatalysts types
- Summary of insertion mechanism
- Catalyst supports
- Catalyst characterization

Industrial Reactors and Processes
- Slurry processes
- Gas-phase processes
- Solution processes

Principles of Mathematical Modeling
- Population balances
- Method of instantaneous distributions
- Monte Carlo simulation

Polymerization with Single-Site Catalysts
- Molecular weight distribution
- Chemical composition distribution
- Long chain branch distribution

Single Particle Models
- Mass and heat transfer
- Polymeric flow and multigrain models
- Particle fragmentation – theory and reality
- Morphology models and particle growth

Polyolefin Microstructural Characterization
- Gel permeation chromatography
- Fractionation Techniques

Parameter Estimation for Kinetic Models
- Homopolymerization models
- Copolymerization models
- Effect of impurities on productivity and molecular weight

Polymerization with Multiple-Site Catalysts
- Characteristics
- MWD deconvolution
- CCD deconvolution
- Mathematical models for TREF and CRYSTAF

Steady-State and Dynamic Simulation of Industrial Reactors in Series
- Simulation of CSTRs in series
- Residence time distribution effects
- Particle size distribution effects

Differential Commodity Polyolefins
- Chain walking and late transition metal catalysts
- Production of thermoplastic elastomers via heterogeneous long chain branching
- Production of linear-block olefin copolymers

Rapid look at thermodynamics
- Thermodynamic impact of condensed mode
- Diffusion, and interpretation of data

From the lab to properties and production
- Chemiometrics and applications
- Design of experiments

A copy of the PRE educational software developed by the instructors will also be provided to the course participants at no additional cost. The PRE education software is composed of a series of Excel spreadsheets covering the following applications:

1. Polyolefin microstructural simulation using Flory's and Stockmayer's distributions
2. Molecular weight and chemical composition distribution deconvolution for multiple-site catalysts
3. Long chain branching modeling
4. Semi-batch and continuous polymerization reactor simulation
5. Polymerization kinetics with coordination catalysts