8th ICPC Short Course on Polyolefin Characterization Techniques

The Westin Valencia Hotel

Sunday, May 21, 2023	
7:30 – 8:15	Registration
Introduction to Polyolefins *Benjamín Monrabal, Polymer Char*	
8:15 – 9:00	• Polymer Identification. FTIR • PE and PP Microstructure • Molar Mass Distribution • Chemical Composition • Bivariate Distribution
GPC Fundamentals *Olivier Boyron, CNRS*	
9:00 – 9:45	• Molar Mass Distribution and Averages • SEC Separation Mechanism • Column Selection • Conventional Calibration • Universal Calibration • Light Scattering • Long Chain Branching Determination
GPC Calculations *Alberto Ortín, Polymer Char*	
9:45 – 10:30	• Conventional GPC • Viscometer • Light Scattering • GPC-IR (MMD-CC)
10:30 – 10:45	*Coffee Break*
GPC – Practical Considerations *Rongjuan Cong, The Dow Chemical Company & Esther López, Polymer Char*	
10:45 – 11:45	• Sample and solvent preparation procedures • Concentration and dissolution time according to sample type • Columns: types, calibrants, performance control • Validation/Verification of GPC data
CCD Techniques- TREF/CRYSTAF/CEF *Benjamín Monrabal, Polymer Char*	
11:45 – 12:45	• Importance of the CCD • Crystallization Fundamentals • TREF / CRYSTAF / CEF / DC • PE and PP Separation
12:45 – 13:45	*Lunch*
High Temperature LC/SGIC *Tibor Macko, Fraunhofer Institute*	
13:45 – 14:30	• Background of HT-LC • SGIC Fundamentals • Applications
TGIC Technique *Rongjuan Cong, The Dow Chemical Company*	
14:30 – 15:00	• TGIC Fundamentals • Experimental • Applications
Cross-Fractionation Technique *Alberto Ortín, Polymer Char*	

15:00 – 15:45	• Types of Cross-Fractionation
	• Analytical TREF x GPC (CFC) Modes and system description
	  ◦ Data processing
	  ◦ Application examples
	• 2D-Interaction chromatography:
	  ◦ SGIC x GPC
	  ◦ TGIC x GPC
	• Applications

15:45 – 16:00	*Coffee Break*
Preparative Fractionation *Laura Santonja, Polymer Char*	
16:00 – 16:30	• Preparative Fractionation Basics • Molar Mass Fractionation • Chemical Composition Fractionation • SGIC and TGIC Fractionation
Applications	
16:30 – 17:30	Application examples

Speakers

Benjamín Monrabal, Ph.D.

Dr. Monrabal holds a degree in Chemical Engineering from the Instituto Químico de Sarriá, Barcelona, and a Ph.D. in Chemistry at the Virginia Polytechnic Institute, USA. He worked for DOW Chemical from 1970 to 1993 in R&D, where he was appointed at the scientist level for his technical contributions to the Polyolefin business. In 1993 he left DOW to found Polymer Char, a company specializing in instrumentation for polymer analysis. He is currently the lead of R&D in the organization. He has been a member of the Editorial Boards of the International Journal of Polymer Analysis and Characterization and the Journal of Liquid Chromatography. He has patented the CRYSTAF and CEF crystallization techniques.

Olivier Boyron, Ph.D.

After a master's degree in analytical chemistry, Olivier Boyron joined the CNRS (National Center for Scientific Research) at the University of Lyon in 2001 as a research engineer. He completed a thesis in the field of polyolefins characterization in the CP2M (Catalysis, Polymerization, Process, and Materials) research laboratory. He is currently in charge of the characterization department of this laboratory where he manages the thermal analysis, SEC, light-scattering and spectroscopy techniques and supervises master and thesis students on polymer analysis topics.

Alberto Ortín, Ph.D.

Dr. Ortín received a Master's Degree in Electronics Engineering at the Polytechnic University of Valencia, Spain, and a Master's Degree in Analytical Chemistry from the University of Valencia. He received his Ph.D. in Chemistry from the same University of Valencia in 2014. He is now a principal scientist at Polymer Char, where he has 25 years of experience in the development of instruments, software, and detectors for different polyolefin characterization techniques, including GPC, TREF, and cross-fractionation.

Rongjuan Cong, Ph.D.

Dr. Rongjuan Cong holds a B.S. degree in Chemistry from Nanjing University, China, and Ph.D. in Chemical Engineering from McMaster University, Canada. After her Ph.D., Rongjuan worked in Chemistry Department of Tulane University and Louisiana State University, USA, in the area of microstructure characterization of polyelectrolyte in complex fluid. Rongjuan is a senior research scientist at Dow. She has been working in polymer microstructure characterization for polycarbonate, thermoplastic polyurethane, polyolefin materials since joining Dow in 2005. She is an inventor of 17 granted US patents. She published over 23 scientific papers in the area of polymer molecular structural characterization.

Esther López

Esther López received a Bachelor's Degree in Chemical Engineering at the Polytechnic University of Valencia, Spain, and a Master's Degree in Analytical Chemistry from the University of Valencia. She was granted by the Spanish government a two-year scholarship for specialization in analytical control of products subject to foreign trade. She joined Polymer Char in 2011, where she has been working in the analytical laboratory focusing on polyolefin characterization by high-temperature GPC. She has also worked on developing new instruments for polyolefin characterization and other separation techniques. She has co-authored several articles and papers and high-temperature GPC separation techniques.

Tibor Macko, Ph.D.

Dr. Macko received an Analytical and Physical Chemistry Engineering degree from the Slovak University of Technology in Bratislava, and holds a Ph.D. from the Polymer Institute of the Slovak Academy of Sciences. He worked for over ten years at the German Institute of Polymers, studying the development of liquid chromatography separations of polyolefins based on selective adsorption and desorption of macromolecules. He now has a trajectory of over 10 years at the Fraunhofer Institute, where he continues specializing in interactive liquid chromatography, and separation and characterization of synthetic polymers, among other techniques. He played a fundamental role in the development of the Solvent Gradient Interactive Chromatography technique.

Laura Santonja, Ph.D.

Ph.D. from the Universitat Politècnica de València in the engineering and industrial production program. Doctoral research focused on assessing the impact of degradation on the morphology and properties of polymers by using thermal analysis techniques. In 2013 she joined Florida State University (USA) to investigate the crystallization process of new polyolefins with relevant crystalline behaviors. Two industries linked to the petrochemical sector participated (Polymer Char (Paterna) and SCG Chemicals, Thailand). She joined Polymer Char in 2017 through a state research program that fosters research at the industrial level. Since then, part of her work as a research scientist has been connected to projects focused on the further optimization of analytical techniques based on the crystallization of polyolefins.