

International Summit on

# Current Trends in Mass Spectrometry

July 13-15, 2015 New Orleans, USA



## Marek M Kowalczyk

University of Wolverhampton, UK

### Mass spectrometry aimed at sequence analysis of natural and synthetic biodegradable macromolecules

Mass spectrometry becomes nowadays a comprehensive analytical technique for copolymer characterization. Copolymers can exist in variety of co-monomer arrangements along the macromolecular chain such as block, gradient, random or alternating copolymers. Moreover, in addition to molecular mass distribution (MMD) the copolymers exhibit co-monomer composition distribution (CCD) and both these factors influence their physical properties for a given copolymer chemical composition. The aims of this study were focused on ESI tandem mass spectrometry of natural aliphatic copolyesters (PHA) and novel sequence-controlled copolymers obtained by anionic ring opening copolymerization of  $\beta$ -substituted  $\beta$ -lactones. Detailed analysis of these copolymers, including molecular chain architecture as well as chemical structure of the end groups, were established based on the ESI-MS/MS collision induced dissociation spectra. The arrangement of co-monomer structural units along the copolyester chains was demonstrated by comparison of the ESI-MS/MS fragmentation spectra and the respective fragmentation pathways. Moreover, the sequence distribution analysis of co-monomeric units confirmed the desired structure of novel sequence-controlled macromolecules. Understanding of the formation mechanisms of sequence-controlled copolymers and a detailed description of the individual reactions taking place at the initiation, propagation and termination of the copolymer chain growth are essential from standpoint of the relations between copolymer structure, properties and function. Thus, the ESI-MS/MS proved to be a favorable technique for structural analysis of the natural and synthetic biodegradable macromolecules.

### Biography

Marek M Kowalczyk received his PhD degree in 1984 from the Faculty of Chemistry, Silesian University of Technology, and DSc degree in 1994 at the same University. He was a visiting Lecturer at the University of Massachusetts in Amherst, MA, USA in 1990 and Marie Curie EU fellow at the University of Bologna, Italy. Currently, he is Professor at the University of Wolverhampton, UK at the Centre of Polymer and Carbon Materials, Polish Academy of Sciences, Zabrze, Poland. He is the author and co-author of over 120 scientific papers and a score of patents. His research interests are novel mass spectrometry techniques for analysis of polymers at the molecular level, mechanisms of anionic polymerization related to the synthesis of biodegradable polymers possessing desired architecture, forensic engineering of biodegradable and functional polymers.

[M.Kowalczyk@wlv.ac.uk](mailto:M.Kowalczyk@wlv.ac.uk)

Notes: