
Mass Spectrometry 2017: Mass spectrometry aimed at sequence analysis of natural and synthetic biodegradable macromolecules - Marek M Kowalczyk - Silesian University**Abstract**

Biodegradable polymers play an important role in human life, increasingly irreplaceable one. Knowledge on the relationships between their structure, properties and function is essential for prospective applications of such materials in the areas safe for human health and environment. When the development of biodegradable polymers was in its infancy the most crucial features were concentrated on the effect of macromolecular architecture, new monomer systems, polymerization mechanisms and different polymerization techniques on final biodegradable properties. Significant efforts have been directed towards specific areas, such as mechanisms of biodegradation, biocompatibility, processing conditions and potential applications in medicine, protection of environment and agro chemistry. However, such aspects like bio-safety of biodegradable polymers or nano-safety of their composites were and still are frequently neglected. In the endeavor to safe biodegradable polymers mass spectrometry methods are of particular importance in (co)polymers analyses due to their high sensitivity, selectivity, specificity and speed. Examples of the mass spectrometry studies for sequencing of biodegradable (co)polymers with the use of multi-stage electrospray mass spectrometry (ESI-MS_n) will be presented. The special emphasis will be given to the ESI-MS_n applications in the synthesis of biodegradable copolyesters as well as ESI-MS_n for identification of selected biodegradable polymers on the way of molecular labeling. The attempts to solve the difficult question regarding the molecular structure of biodegradable copolymers with relation to the specific area of applied research will be also discussed.

KEYWORDS: Biodegradable polymers, PHA, mass spectrometry, sequencing.

INTRODUCTION

Biodegradable polymers assume a significant job in human life, progressively turning out to be having an indispensable job. This worries specifically clinical items, including for instance bioresorbable stitches or embeds. It additionally concerns natural issues in the territory of compostable polymeric bundling materials of food, which could lessen the measure of as of now created bulky bundling waste from customary plastics. At the point when the advancement of biodegradable (co) polymers was in its early stages explore centered upon the impact of macromolecular engineering, new monomer frameworks, polymerization components, and diverse polymerization procedures on last biodegradable properties. Critical endeavors have been coordinated towards explicit zones, for example, instruments of biodegradation, biocompatibility, preparing conditions and potential applications in medication, security of condition and agro science. Be that as it may, such perspectives like bio-wellbeing of Biodegradable polymers or nano-security of their composites were, and still are, oftentimes dismissed. Lately there has been a fast increment in the quantity of distributions on biodegradable polymers with certain reports showing impediments and complexities in their applications (especially in the region of biomaterials). Thusly there is a dire need to look at and limit any potential misfortunes identified with their future significance for progress and social capacity (1). Later on it is critical to structure such biodegradable polymers that would be ok for human wellbeing and the earth, and to demonstrate dependably and reasonably new zones where their one of a kind properties could be embraced.

In the undertaking to protect biodegradable (co)polymers their distinguishing proof at the atomic level ought to be investigated. For this reason mass spectrometry

techniques are of specific significance in (co)polymer examinations because of their high affectability, selectivity, particularity and speed. Polymer researchers have been new to the advances made in the field of current mass spectrometry for quite a while. Nonetheless, on account of spearheading works, including among others the Professor Giorgio Montaudo Italian school of polymer mass spectrometry, today mass spectrometry supplements from numerous points of view the basic information gave by NMR, IR and other polymer portrayal techniques (2).

Advancement of delicate ionization strategies in mass spectrometry have assisted with understanding the troublesome inquiry in regards to the atomic structure of

(co) polymers. Partaking in the "Electro shower Revolution", we have focused on multistage MS in polymer science assessing ring opening polymerization (ROP) systems of chose bull non-cyclic monomers, on sub-atomic level portrayal of aliphatic biopolyesters by multistage MS, and as of late on utilization of MS in scientific designing of cutting edge polymer materials (3). In this small survey MS succession examination of regular and engineered biodegradable macromolecules will be talked about with the unique accentuation on the particular region of applied research on aliphatic biopolyesters and their engineered analogs.

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