



Maria Valentina Dinu

Dr. Habil. Maria Valentina Dinu studied Chemistry at “Al. I. Cuza” University of Iasi, and received her Ph.D. in 2009 from Romanian Academy, *Petru Poni Institute of Macromolecular Chemistry (PPIMC) of Iasi*. During her Ph.D. studies, an important part of the work was carried out at Istanbul Technical University, Turkey, and Wroclaw University of Technology, Poland. In April 2010, she won a post-doctoral fellowship, which was financially supported by the European Social Fund – “Cristofor

I. Simionescu” Postdoctoral Fellowship Programme. Within the research activities performed during this post-doctoral fellowship (2010-2013), she spent some months as invited PostDoc in Leibniz Institute of Polymer Research Dresden, Germany, and Institute of Macromolecular Chemistry, Prague, Czech Republic. After working as PostDoc at the Department of Chemistry, University of Basel, Switzerland, she returned to the Functional Polymers Department of PPIMC, in 2015, as a Senior Researcher. In December 2020, she defended the Habilitation thesis and is Member of the “School for advanced studies of the Romanian Academy” as PhD thesis supervisor in PPIMC. Dr. Dinu is highly active in the field of synthesis and functionalization of various hydrogel-based systems, composite materials, and (bio-) functional self-organized polymeric nanostructures, being co-author of 112 papers, with an H-index of 37. In 2012, she received the “Nicolae Teclu” Romanian Academy Award. Currently, Dr. Dinu is Group Leader in the Department of Functional Polymers, PPIMC and is acting as an editor of *Reactive and Functional Polymers* from Elsevier, B.V.

Talk: From chitosan to advanced composites: Sustainable materials for environmental remediation

Chitosan, a polycationic biopolymer obtained by the deacetylation of chitin, has evolved from an inexpensive biomaterial into a versatile platform for the design of advanced materials for environmental protection. Its abundance, biodegradability, biocompatibility, low toxicity, and, in particular, its reactive amino and hydroxyl groups offer a unique combination of chemical functionality and material versatility. At the same time, these intrinsic advantages are accompanied by significant limitations, including limited mechanical stability, pH sensitivity, and reduced performance under certain environmental conditions. These challenges have stimulated the development of chitosan derivatives and composites with tailored physicochemical and functional properties.

This lecture will explore how the chemistry of chitosan can be translated into the design of efficient and sustainable materials for environmental remediation. Starting with the structure, sources, and production of chitosan, the main strategies used to modify and functionalize this biopolymer, including chemical modification, cross-linking, incorporation of inorganic and





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carbon-based phases, and the formation of multifunctional hybrid composites, will be examined. Particular attention will be given to how these approaches influence surface chemistry, porosity, stability, charge, selectivity, and transport properties, and how these characteristics ultimately determine environmental performance.

Building on these fundamental aspects, the discussion will focus on applications in water and wastewater treatment, including the removal of heavy metal ions, dyes, pharmaceuticals, pesticides, and biological contaminants. The roles of chitosan-based materials in adsorption, coagulation-flocculation, membrane processes, catalysis, and hybrid treatment systems will be also considered, with emphasis on the underlying mechanisms and on the relationship between material structure and process performance.

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