SPEAKER

NAME
Prof. Dr. rer. nat. Karin Stana Kleinschek

CONTACT
Graz University of Technology
Faculty of Technical Chemistry, Chemical and Process Engineering and Biotechnology
Stremayrgasse 9
8010 Graz
Austria
E-Mail: karin.stanakleinschek@tugraz.at

BIOGRAPHY

Karin Stana Kleinschek, obtained her PhD degree from the Institute of Physical Chemistry of the University of Graz, Austria. Her field of expertise is surface modification and characterization of biopolymers, especial polysaccharides and its usability in biomedical applications, biomaterials, 3D bioprinting and new bioinks development, biopolymer composites.
She led more than 15 years the Institute of the Engineering Materials and design and the Laboratory for Processing and Characterization of Polymers LCPP at University of Maribor, Slovenia and is from 2020 a Head of the Institute of Chemistry and Technology of Bio Based Systems, Faculty of Technical Chemistry, Chemical and Process Engineering and Biotechnology, Graz University of Technology, Austria. She teaches various courses on Organic Chemical Technology, Functional Polymers, Biopolymers in advanced applications, Macromolecular Materials and Material Technologies - Composite Materials. She is also a full Prof at the University of Maribor, Faculty of Electrical Engineering and Computer Science, Maribor. From 2011- 2015 she was a Vice Rector for Research and Development of the University of Maribor, Slovenia. She is a member of various scientific organizations, as for example she is a vice president of research of European Polysaccharide Network of Excellence EPNOE. Since 2013 she is a member of the European Academy for Science and Art and from 2014 permanent member of Slovenian Academy of Engineering. Her scientific bibliography consists of more than 1,100 units, including 203 scientific peer-reviewed papers; she participates and coordinates numerous of national as well as international research projects and supervises master, doctoral and postdoctoral students.

LECTURE

Biopolymers and their potential application in biomedicine

Understanding interactions of solid biomaterials with living systems or their constituents (proteins, nucleic acids, oligo- and polysaccharide, lipids) is prerequisite for applications in regenerative medicine, as vascular grafts, as biosensors or as low protein fouling layers. In that respect polymeric thin films and coatings are useful for basic investigations of interactions due to their defined character, reproducible preparation and accessibility to modern surface analytical techniques. Among these techniques are atomic force microscopy (AFM), X-ray photoelectron spectroscopy (XPS), quartz crystal microbalance (QCM-D), surface plasmon resonance (SPR) and fluorescence microscopy. Studying the surface properties of these materials allows for a correlation of the physicochemical composition, morphology and wetting, with polysaccharide, protein or living cells' adhesion or growth on these materials. Polymeric biomaterials can further be coated on specific substrates or shaped into 3D printed, nano-fibrous or particulate objects useful for mentioned biomedical applications. Those materials can optionally be based on synthetic biodegradable polyesters (e.g. polycaprolactone, PCL), semi-synthetic polysaccharide derivatives bearing charges or hydrophobic moieties, or other naturally occurring polymers. This lecture will give examples on what kind of chemical reactions and surface modifications can be performed with biodegradable or bio-based polymers and how these materials can be processed into various shapes ranging from thin films to 3D printed objects. Besides processing, examples on detailed surface interaction studies will be given that elucidate large differences in the physicochemical characteristics of the materials. These differences are correlated with the response of living cells exposed to and grown on materials modified and processed with the knowledge obtained from basic surface and polymer analytical studies.

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