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UNIVERSITÄT
WÜRZBURG

Fakultät für Chemie und Pharmazie
MAKROMOLEKULARE
CHEMIE

Center of
POLYMERS
FOR LIFE

You are cordially invited to our seminar on current topics in Macromolecular Chemistry

"Polysaccharides and Proteins as Biopolymer Nanomaterials in Drug Delivery and Biocatalysis"

by Prof. Dr. Peter Wich

Associate Professor | ARC Future Fellow
Head of UNSW Research Lab for Functional Biopolymers
University of New South Wales
School of Chemical Engineering
Science and Engineering Building, E8
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Thursday, July 30 2026, 2:00 pm
Center of Polymers for Life (CPL)
Seminar room ground floor,
Campus Hubland South,
Theodor-Boveri-Weg C10, 97074 Würzburg

You are welcome to schedule personal meetings with the speaker on either before or after the presentation – feel free to contact Ms. Özlem De Michael (oezlem.de-michael@uni-wuerzburg.de).

Lutz Nuhn

Polysaccharides and Proteins as Biopolymer Nanomaterials in Drug Delivery and Biocatalysis

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Nature's polymers, such as polysaccharides and proteins, show remarkable versatility as multifunctional materials. They can be easily modified with the toolkit of bioorganic chemistry and are attractive because of their degradability and biocompatibility. The presentation will feature our latest results on nanoparticle and hydrogel systems that contain chemically modified polysaccharides and enzymes.

The polysaccharide dextran is a versatile biopolymer starting material. Conjugation with synthetic and bio-derived polymers results in biohybrid materials that can assemble into responsive nanoparticles and show triggered disassembly and payload release. As an example, we present an acid-responsive amphiphilic block copolymer made of acetalated dextran (AcDex) and polyoxazoline. For this, an end group-modified dextran was conjugated with polyoxazoline via a Cu-click reaction to obtain a hydrophilic block copolymer. The resulting material self-assembles into micellar nanoparticles and can transport reactive oxygen species (ROS) responsive dimeric prodrugs for targeted cancer treatment.

Similarly, we explore enzyme conjugates as materials for nanoparticles and hydrogels in order to obtain active materials that show high efficiencies in biotransformations and catalytic applications. The presented examples include hybrid enzyme-polysaccharide conjugates that can catalyse therapeutic prodrug activation. We will also show our latest results on biocatalytic enzyme bioinks for extrusion-based bioprinting. The enzymes become an integral part of the bioink network and demonstrate high stability and prolonged catalytic activity compared to physically entrapping the enzymes inside the hydrogel. These 3D-printed enzyme hydrogels have demonstrated high in vitro catalytic activity, making them promising candidates for wound healing applications.