

Wednesday, 8th May, 12.00 pm, Seminar Room

Host: Dr. Niels C. Reichardt

Shine a Light on Carbohydrates

Martina Delbianco

Department of Biomolecular Systems

Max Planck Institute of Colloids and Interfaces

Am Mühlenberg 1, 14476 Potsdam, Germany

Polysaccharides are the most abundant organic materials in nature, yet correlations between their three-dimensional structure and macroscopic properties have not been established. Automated glycan assembly (AGA) enables the preparation of well-defined oligo- and polysaccharides resembling natural as well as unnatural structures. A collection of related compounds, modified at specific positions of the chain, is presented. These synthetic glycans are ideal probes for the fundamental study of polysaccharides, shedding light on how the modification patterns affect the polysaccharides properties (i.e. three dimensional shape). Molecular modelling simulations and NMR analysis show that different classes of polysaccharides adopt fundamentally different conformations, drastically altered by single-site substitutions.

Moreover, these synthetic oligosaccharides are shown to self-assemble into nanostructures of varying morphologies. Well-defined differences in chain length, monomer modification, and aggregation methods yield glycomaterials with distinct shapes and properties. These novel synthetic materials show unexpected excitation-dependent optical properties in a broad range within the visible spectrum, illustrating their potential for use in optical devices and imaging applications.

References:

- [1] M. Delbianco, A. Kononov, A. Poveda, Y. Yu, T. Diercks, J. Jiménez-Barbero, P. H. Seeberger, *J. Am. Chem. Soc.* **2018**, *140* (16), 5421. [2] A. Pardo-Vargas, M. Delbianco, P.H. Seeberger, *Curr. Opin. Chem. Biol.*, **2018**, 46, 48