Einladung
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Seminartag
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Dr. Jan Vogelsang
Universität Regensburg (AG Lupton)

“Unraveling intra- and interchromophoric processes in well-defined macromolecules as models for conjugated polymers”

Abstract:

Conjugated polymers offer wide application potential but remain intractable to a fundamental microscopic understanding of electronic structure. Simple questions relate to the interplay between elementary photoexcitations - excitons - and overall molecular dimensions and morphology. Excitons span only a few nanometres of the molecule, which itself can extend over microns. Where is the exciton formed within a conjugated segment? Is it always situated on the same repeat units? Does the exciton have intra- or inter-chain character? And once it is formed, how does it interact with neighbouring conjugated segments?

To answer these questions we introduce well-defined macromolecules as model systems, which are studied by single-molecule spectroscopic methods. A novel structurally-rigid model of extended π-conjugation based on highly-emissive giant shape-persistent molecular spoked wheels 7nm in diameter is used to follow the dynamics of exciton localisation. A set of π-conjugated oligomer dimers templated in molecular scaffolds is used to reveal dynamics in energy transfer and electronic aggregation between two oligomers in either parallel conformation with different well-defined distances or in oblique-angle geometry. In bulk polymer films, strong and weak interchromophoric coupling impacts the functionality, e.g. the emission color and the migration of excitation energy to quenching sites. Identifying the presence and dynamics of such interactions is crucial for understanding limitations in quantum efficiency of larger conjugated polymer materials.

Gastgeber: Prof. Dr. John Lupton