Seminar

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Macromolecular Material Design *via* Modular Synthetic Strategies

The present lecture will describe how modular synthetic strategies in polymer chemistry can be employed to not only construct highly defined complex macromolecular architectures, yet also be used in applications ranging from bonding/debonding on demand networks to nano-porous material design and switchable interfaces. The specific chemistries to be addressed include fast, quantitative and mild ligation *via* (hetero) Diels-Alder chemistries, mechanistic switches from living radical protocols to ring opening polymerization, spin trap systems as well as the use of efficient photo-chemistries to ligate variable enes and dienes (including biomarkers) in a spatially resolved fashion. It will be demonstrated how the reversibility of pericyclic reactions ('dynamic covalent chemistry') can be employed to periodically alter the physical characteristics of macromolecular materials with regard to intrinsic viscosity, color, configuration as well as micro- and nano-structure. The modification of nano-objects – including fullerenes and single-walled carbon-nanotubes – *via* pericyclic reactions will additionally be addressed. Moreover, the use of modular ligation for the build-up of highly defined $\alpha,\beta,\gamma,\omega$-mutually H-orthogonal-donor/acceptor systems for single chain assembly emulating the folding behavior of biomacromolecules will be highlighted, showing a possible pathway for the construction of entirely synthetic protein-mimicking entities. The synthetic efforts will be underpinned by the in-depth characterization of the obtained macromolecules *via* hyphenated techniques including SEC-ESI-MS and LACCC-SEC.

Wednesday, October 26, 14h15

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