DEPARTMENT OF CHEMISTRY AND PHYSICS OF MATERIALS

ANNOUNCEMENT

PARIS LODRON UNIVERSITÄT SALZBURG

Vortragsankündigung

Mittwoch, 8. Jänner 2025, 11.15 Uhr im SR I

Prof. Dr. Stephen SCHRETTL

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"Harnessing Supramolecular Assembly for Responsive Polymer Materials"

The self-assembly of distinct monomeric building blocks that feature directed non-covalent interactions furnishes supramolecular polymers. The application of specific (external) stimuli that weaken the non-covalent bonds can trigger a temporary disassembly of the building blocks, which can impart the corresponding materials with useful responsive functionalities. In this presentation, we report recent results that leverage supramolecular self-assembly to create polymer films with both tailored mechanical properties and desirable responsive behaviors. A method will be discussed that blends two types of building blocks in varying ratios to achieve enhanced mechanical properties and spatially modulated behaviors that mimics the anisotropic properties of complex natural materials. Additionally, we introduce new supramolecular strategies for developing materials that produce distinct optical signals when mechanically deformed. We developed motifs that allow to directly link molecular-level changes in supramolecular binding to macroscopic material behaviors. This approach enables us to probe the extent of assembly and disassembly as influenced by cross-linker content, processing history, and applied stimuli. Our presentation will highlight how such motifs can be used as a tool for the in-situ study of dynamic assembly mechanisms in supramolecular systems, offering fresh insights into their mechanoresponsive behavior.

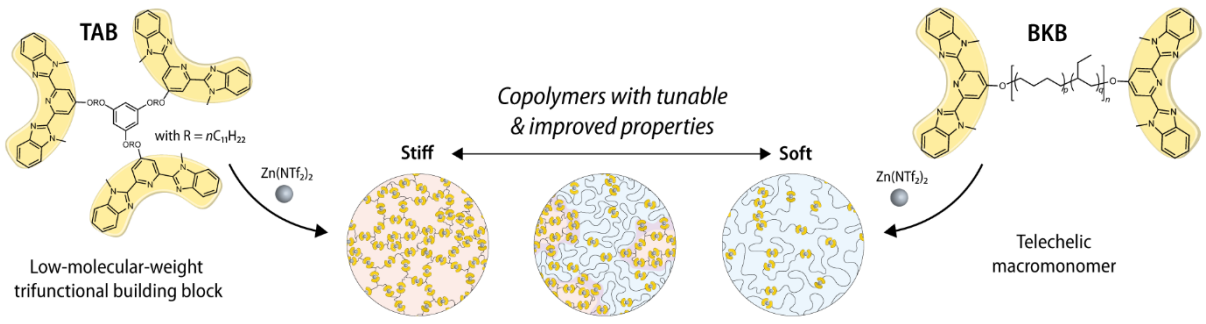

Figure 1. Individual metallosupramolecular polymers are assembled from trifunctional (TAB) or telechelic (BKB) building blocks, and their combination affords copolymers with tunable mechanical properties.

Key references:

Sautaux, J., Marx, F., Gunkel, I., Weder, C. & Schrettl, S. Mechanically robust supramolecular polymer co-assemblies. *Nat. Commun.* **13,** 356 (2022).

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Traeger, H., Sagara, Y., Kiebala, D. J., Schrettl, S. & Weder, C. Folded Perylene Diimide Loops as Mechanoresponsive Motifs. *Angew. Chem. Int. Ed.* **60**, 16191-16199 (2021).

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Kiebala, D. J., Style, R., Vanhecke, D., Calvino, C., Weder, C., Schrettl, S. Sub-Micrometer Mechanochromic Inclusions Enable Strain Sensing in Polymers. *Adv. Funct. Mater.* ***33***, 2304938 (2023).

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