Technische Universiteit Eindhoven University of Technology

Water-Soluble Supramolecular Polymers

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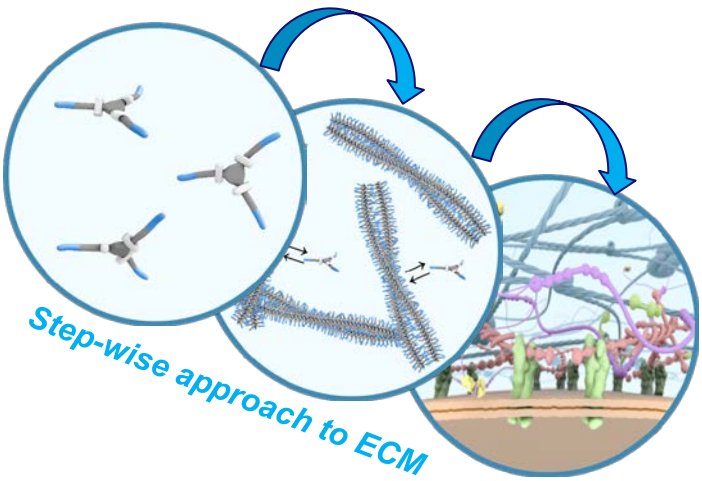
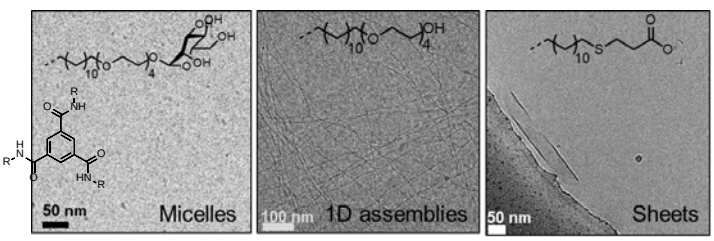
Supramolecular Polymers in Water

Supramolecular polymers provide a conceptually novel approach for mimicking the extracellular matrix (ECM). To synthetically recreate the complexity of the ECM, we select a bottom-up approach in which we focus on benzene-1,3,5-tricarboxamide-based systems as a model. **By understanding in detail the relation between molecular structure, stability, and dynamic behavior in water, we go step-by-step to highly functional biomaterials that mimic the functions of the ECM.**



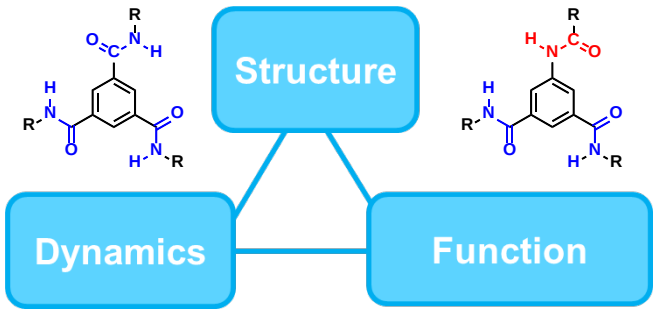
Self-assembly of BTAs in water

We recently started to elucidate how the morphologies formed by BTAs in water depend on the size and nature (neutral, charged) of the water soluble part. As a result, spherical micelles, cylindrical micelles and sheet-like structures can be accessed by small changes in the molecular structure.



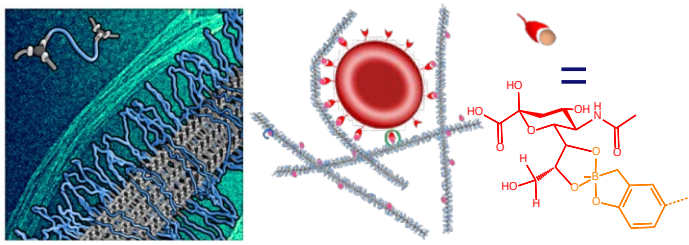
The Magic Triad

We systematically probe the relation between molecular structure, stability and dynamic behavior of a series of BTA-based molecules. Hereby, we recently elucidated that BTAs tend to form double helices in water, which enhances their stability. More importantly the copolymerization of different types of monomers allows to tune stability and dynamic behavior independently. These copolymerisations need further optimization and quantification.



Hydrogels and Multivalent Structures

Telechelic BTA-end-capped polymers form elastic hydrogels in water. Using differently functionalised BTAs, the dynamics are tuned at the nanoscopic and macroscopic level. In addition, multivalent interactions are possible due to the high degree of functionality of the surface of the 1D polymers and introduce bioactivity into the gels.



Masterprojects

Our BTA team is looking for masterstudents (ST or BMT) interested in working at the interface of biology and chemistry. Interest in synthesis and affinity for working with cells are highly desired.

/ Macromolecular and Organic Chemistry

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