Technische Universiteit Eindhoven University of Technology

Single Chain Polymeric Nanoparticles

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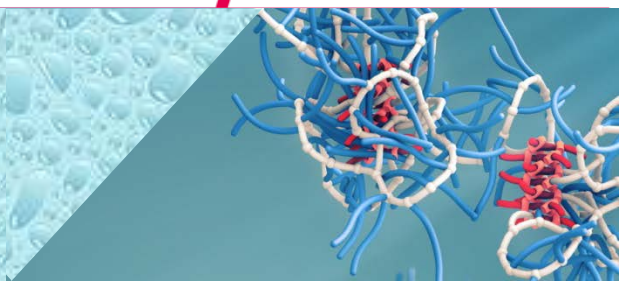
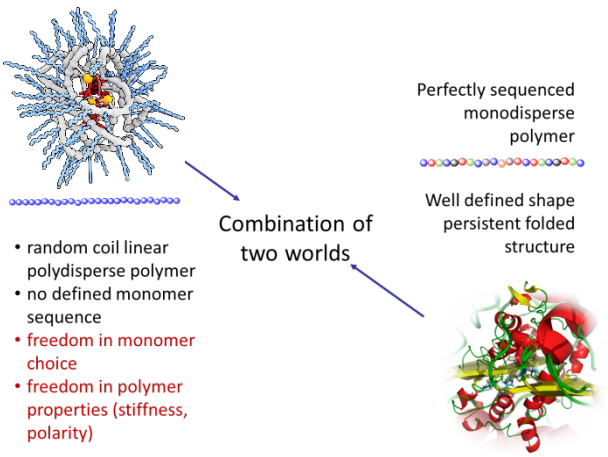


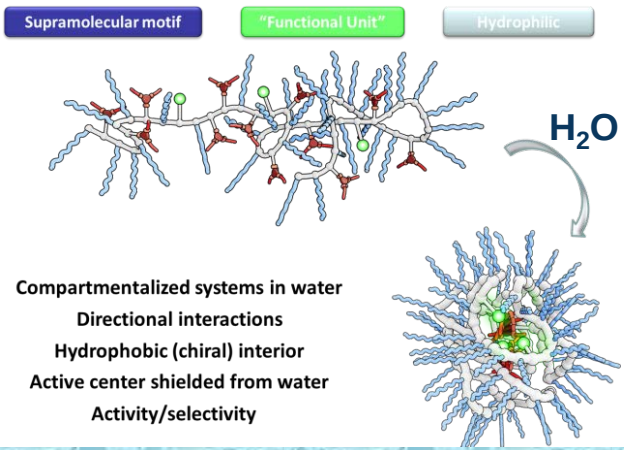
Natural versus synthetic polymers

Natural polymers such as polypeptides fold into perfectly defined 3D nanostructures whereas synthetic polymers are usually present as random coils. Combining the two worlds affords synthetic polymers with emerging applications in catalysis and sensing. This research explores the possibilities offered by these so-called single chain polymeric nanoparticles (SCPNs). **Ultimately, we want to create SCPNs that perform complex catalytic reactions in cellular environments and take over the function of natural enzymes.**



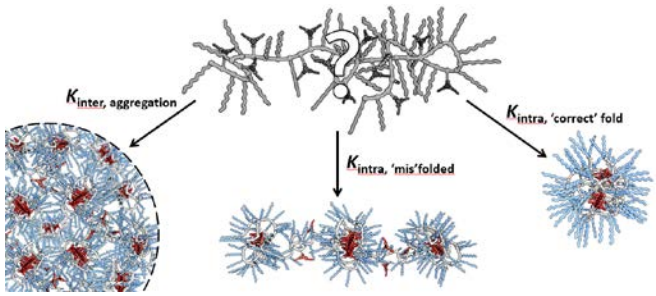
How to make a SCPN?

Precision polymer synthesis permits to prepare well-defined copolymers with pendant sticky units and water-compatible side chains, which fold in water.



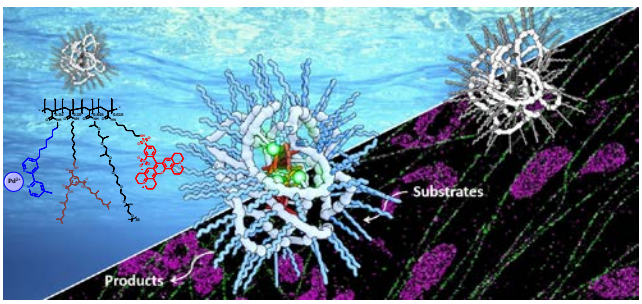
How to fold a polymer into a SCPN?

Different designs of the SCPN result in different types folded structures. Optimization of the hydrophobic/hydrophilic balance is crucial, as well as tuning the degree of polymerization and molar mass dispersity. As a next step, we need to correlate the structure (shape and size) of the SCPN to its stability and function.



Bio-orthogonal Catalysis in Complex Media

We observed that the hydrophobic shielding of metal-based and organo-based catalysts results in efficient catalysis in water. As a next step, we evaluate bio-orthogonal catalysis in demanding media such as cellular environments and cells. Herewith, we aim to uncage prodrugs at desired sites or combine bacterial expression of useful compounds with in situ synthetic modifications



Masterprojects

Our SCPN team is looking for masterstudents (ST or BMT) interested in precision polymer synthesis, detailed characterisation studies, catalysis experiments and studying the interactions of SCPNs with cells.

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