Technische Universiteit Eindhoven University of Technology

Single Chain Polymeric Nanoparticles

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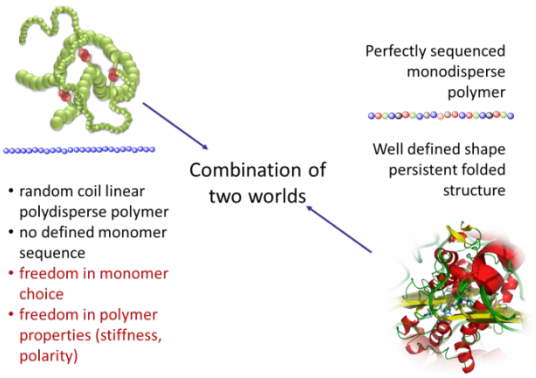
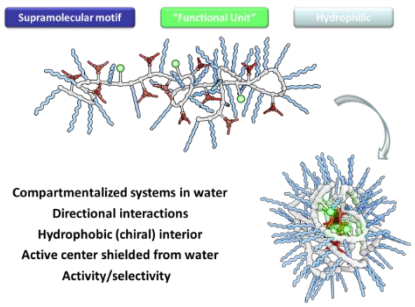
Natural versus synthetic polymers

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.



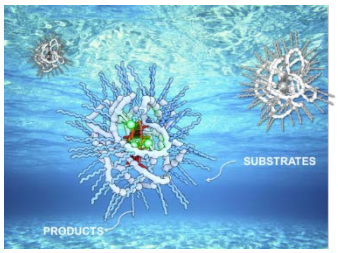
How to make a SCPN?

Precision polymer synthesis permits to prepare well-defined copolymers with pendant sticky units and water-compatible side chains, which fold in water. We are also heavily involved in preparing these SCPN in a dynamic way, by which the best possible is evolved in a kind evolution process.

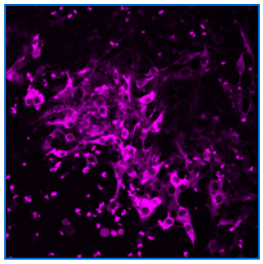


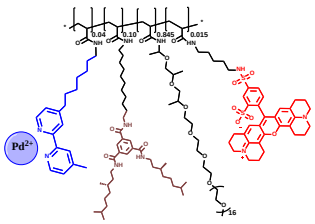
Catalysis in complex media

When catalytic centres are included in these SCPN's, intriguing reactivity's are forecasted when the polymers are folded correctly. Different designs of the SCPN result in different types of catalytic reactions in water. We are aiming at optimizing their activity and selectivity.



We will investigate if shielding of the catalyst results in efficient catalysis in demanding media such as cellular environments and cells





How to aggregate SCPN's?

The next question that is vital to understand the behaviour of our newly designed SCPN's is their ability to aggregate. Several approaches are studied to bias the self-assembly of these folded macromolecules. These studies will also lead to apply them.

Masterprojects

Our SCPN team is looking for master students interested in precision polymer synthesis, detailed characterisation studies, catalysis experiments and studying the interactions of SCPNs with cells. Both ST and BMT students are welcome.

More information: *www.meijerlab.nl* & *e.w.meijer@tue.nl*