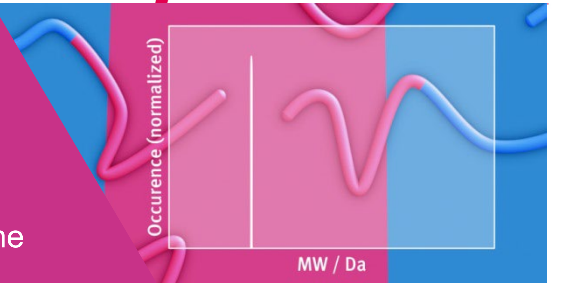
Technische Universiteit Eindhoven University of Technology



Functional supramolecular polymeric materials

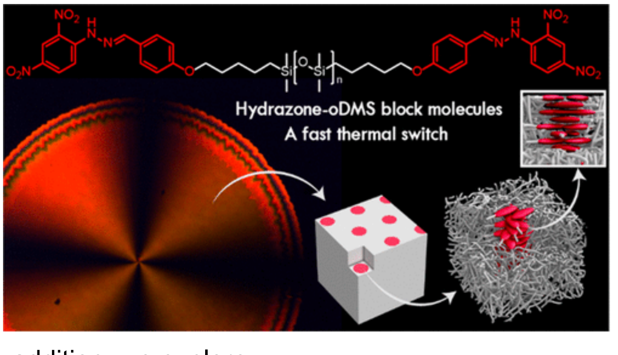
Group Prof. Dr. E. W. Meijer and Dr. Ghislaine Vantomme

Supramolecular materials for the future

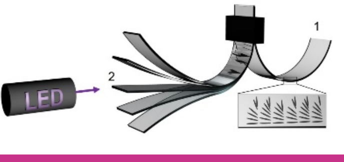
Novel self-assembled polymer materials are needed to **create a paradigm shift in electronic materials, nanolithographic applications, and responsive materials**. In contrast to commonly used approaches in this field, we focus on polymeric materials that are **perfectly defined at the molecular level**. The advantage of this approach is that molecular structures can be directly related to macromolecular properties. The nature of the envisaged application determines which (combination of) molecular designs will be applied.

Assembly of Block Molecules

We explore an organic approach to make nanomaterials with highly ordered, one- or two-dimensional molecular morphologies with domain sizes <10 nm. These materials are phase-segregated block molecules functionalized with oligodimethylsiloxanes (oDMS) of discrete length. By incorporated hard blocks with electronic properties, we aim at making the next generation of thin transistors. Processing conditions are compatible with the current infrastructure of the microelectronics industry, demonstrating commercial relevance.

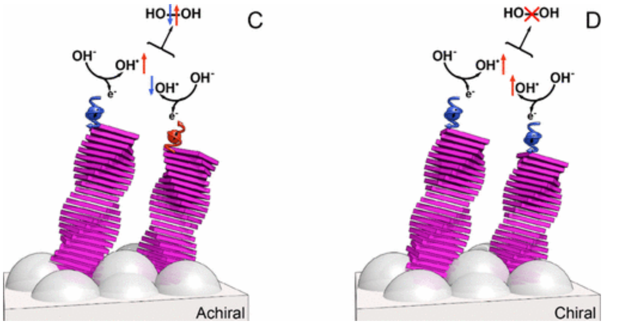


In addition, we explore macroscopic motion of well-ordered materials for the development of soft robotics.



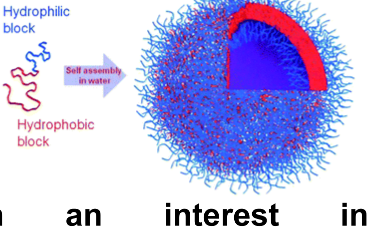
Chiral Induced Spin Selectivity

The CISS effect relates to how electrons travel through a chiral environment. When electrons go through chiral assemblies, one state of the spin is preferred over the other. This selectivity of the spin can change the product of a chemical reaction. It has for example been exploited to increase the efficiency of hydrogen production through water splitting. We currently explore a supramolecular multi-step approach to prepare chiral electrodes and use the CISS effect to synthesize chiral polymers.



Block copolymers for ultradefined vesicle formation

Vesicles based on amphiphilic block copolymers are crucially important carrier systems for i.a. drugs and (bio)catalysts. Remarkably, the effect of molar mass dispersity and compositional purity on the efficacy of the vesicle formation have never been investigated. We synthesize ultradefined block copolymers and investigate the consequences of a defined molecular structure on vesicle formation and properties in drug delivery systems.



Masterprojects

Students with an interest in macromolecular properties and application oriented research and that like to combine synthesis with device fabrication are welcome to strengthen our functional polymer materials team.

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