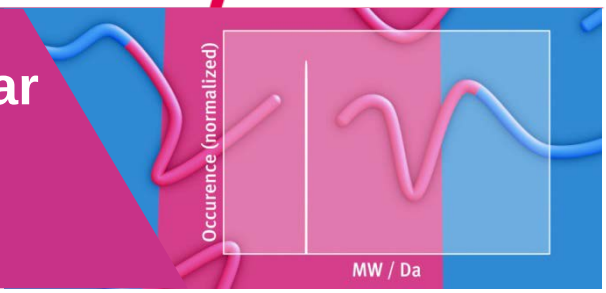
Technische Universiteit Eindhoven University of Technology

Functional supramolecular polymeric materials

Group Prof. Dr. E. W. Meijer

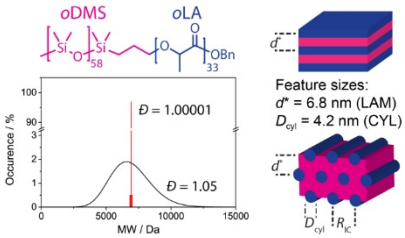


Supramolecular polymeric materials

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

Ultra-defined block copolymers for nanolithography

We explore an organic approach to block copolymer synthesis with various compositions. These form well-organized morphologies on various substrates and domains with sizes <10 nm. Processing conditions are compatible with the current infrastructure of the microelectronics industry, demonstrating commercial relevance.



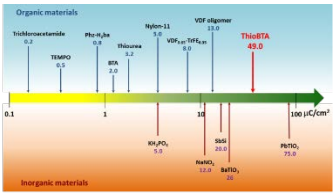
In addition, we explore monodisperse copolymers with pendant supramolecular motifs at exactly defined positions as an alternative nano-lithographic patterning approach.

Supramolecular materials in motion

Together with the group of Dick Broer, we design, synthesize and study new materials that can self-oscillate upon external triggers.

Organic ferroelectrics

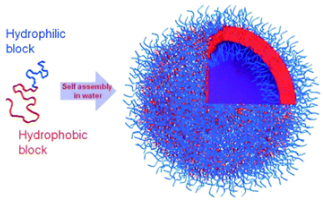
We discovered organic molecules with a ferroelectric response higher than most inorganic ferroelectrics. The next step, to go from a molecule to a processible material now needs to be taken.



In close collaboration with the Weizmann Institute and Cambridge University we explore the possibilities to use chiral organic semi-conductors for water-splitting

PEG-PLA-based block copolymers for ultradefined polymer 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 here explore the synthesis of ultra-defined PEG-PLA-based block copolymers and investigate in detail the consequences of a defined molecular structure on vesicle formation and properties in drug delivery systems.



Masterprojects

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

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