Within the research groups Stimuli-responsive Materials and Devices and Membrane Materials and Processes at Eindhoven University of Technology (TU/e) and Wetsus, Centre of Excellence for Sustainable Water Technology we have a vacancy for a Ph.D. position.

**Ph.D. position:**

**Freestanding membranes with ordered, self-aligned pores for valorization of aqueous streams and ion separations**

**Motivation**

Already since decades researchers attempt to mimic biological cell membranes to create membranes with well-defined, perpendicular pores applicable in large-scale technological applications such as water purification and selective ion removal. Recently, it was shown that liquid crystalline polymers can self-organize into molecular organization into membranes with films with homogeneous uniform straight-through pores. This project is dedicated to the development and engineering of such liquid crystalline, isoporous materials into membranes for water purification and selective recovery of e.g. valuable minerals and proteins and amino acids in the dairy industry.

**Research challenge**

This research uses the above-described polymer concept to develop the next generation polymer membranes with isoporous, straight pore. Different LC polymer chemistries and chemical modifications will be used to design membranes. The chemistry and the preparation method allow tuning of the membrane functionality, pore size, selectivity and fouling propensity for selected applications. Detailed chemical and membrane characterization is required to provide insight in the molecular organization and the membrane characteristics of the synthesized polymers and membranes while at the same time these can be used to understand the membrane process performance in the real industrial application. The project exhibits a strong connection between membrane development, membrane characterization and the final industrial application using model solutions, artificial industrial feeds and real industrial feeds. The project requires a profound background in synthetic and polymer chemistry.

The department of Chemical Engineering and Chemistry at Eindhoven University of Technology has an excellent track record in (liquid crystalline) polymer chemistry (Prof. Schenning) and membrane science and technology (Prof. Nijmeijer). This is combined with the strong multidisciplinary research character and industrial network of Wetsus. Extensive sophisticated state of the art facilities for polymer chemistry, membrane development, polymer and membrane characterization and membrane performance evaluation are available at both Wetsus and Eindhoven University of Technology.

**Requirements**

We are looking for a candidate with a MSc degree in organic chemistry or polymer chemistry and a scientific attitude. Candidates with a MSc. degrees in membrane technology or a related field are also welcome to apply but should have a proven strong affinity with synthetic chemistry. The candidate should have excellent experimental and theoretical skills.
Partnership
The PhD project will be executed within the Wetsus research theme Desalination. The following companies are part of this theme: DMT (NL), Esco (DE), FrieslandCampina (NL), FujiFilm (NL), Shell (NL), Van der Knaap (NL), Vitens (NL) and Yara (NL).

Promotor: Prof.dr.ir. Kitty Nijmeijer, Eindhoven University of Technology (Membrane materials and processes; www.tue.nl/mmp) and Prof. dr. Albert Schenning, Eindhoven University of Technology (Liquid crystalline polymer materials; https://www.tue.nl/en/research/research-groups/stimuli-responsive-functional-materials-devices/)

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