Group : Responsive Supramolecular Polymers
Project : **Smart Materials – Dynamic Polymers**
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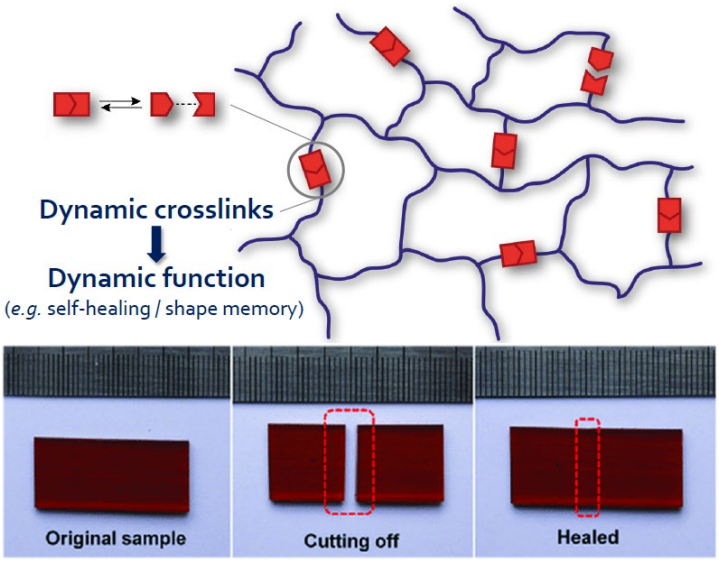
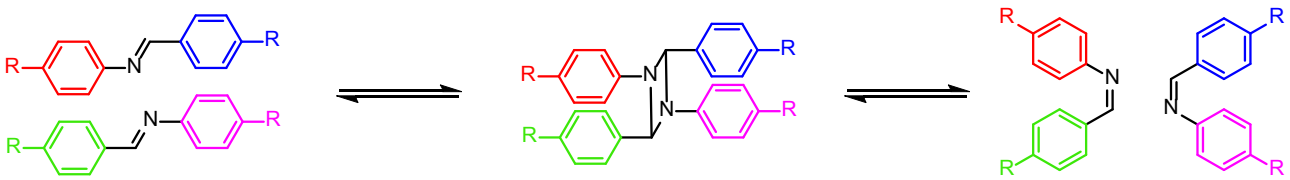
Introduction

In this project you will be focussing on the development and characterisation of *Smart Polymer Materials*. We consider a material *Smart* when it has several dynamic features including stimuli responsiveness or self-healing ability.[1]

For the synthesis of these materials we construct *polymer networks* that consist of *dynamic* building blocks. The virtue of the dynamic parts in the network structure is that they create a molecular flow into the otherwise static material. This feature is also what makes the polymers *smart*, as this dynamicity can be controlled.[2]



As the dynamic component we mainly focus on reversible imine chemistry. Imines, which are basically double bonded C=N moieties, have the ability to interact with each other and exchange their end groups.[3] This bond exchange can be influenced based on the molecular structure of the rest groups. We envisioned that especially aromatically linked imines are excellent candidates to tune the bond exchange, and therefore the macroscopic properties of the material.



The overall project consists of a narrow collaboration between the laboratories of organic (ORC) and physical chemistry (PCC). The organic part of the project will focus mainly on the *synthesis* and characterisation of different types of monomers, whereas the physical part of the project will focus more on the characterisation of the polymeric materials. For example, *rheology* is a powerful tool to study these materials and offers a broad spectrum of possibilities to investigate everything a certain material can and cannot do. Based on the interest of the student, they can choose to have a broader focus on either the organic or the physical part as well.

Techniques to be used

- Organic synthesis, purification and material processing
- Characterisations: NMR, IR, MS, UV-VIS
- Material testing: Rheology, DMA, TGA and more to be determined.

More information

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References

1. Zhao, J.; Xu, R.; Luo, G.; Wu, J.; Xia, H. *J. Mater. Chem. B* **2016,** *4*, 982.
2. García, F.; Pelss, J.; Zuilhof, H.; Smulders, M. M. J. *Chem. Commun.* **2016,** *52*, 9059.
3. García, F.; Smulders, M. M. J. *J. Polym. Sci., Part A: Polym. Chem.* **2016,** *54*, 3551.