

3) TITLE: **Smart nano-sensors made of stimuli-responsive polymers in solution and in thin films**

Whereas macroscopic sensors made of stimuli-responsive hydrogels are well established, in the nanoworld such sensors still face many challenges. Potential fields of application of such sensors extend from engineering to bioengineering and medicine, e.g. as nanosensors for the control of concentration of glucose for diabetes patients or as switchable surface in the frame of tissue engineering. In this experimental project smart hydrogels, made of stimuli-responsive hydrogels will be investigated. Hydrogel films with thicknesses of a few tens to some hundreds of nanometers and spontaneously deswell or swell due to external stimuli, like temperature or the concentrations of ions. The changes in thickness and in molecular interactions in swelling or collapsing hydrogels will be probed during the switching process by different lab-based techniques. A comprehensive understanding of the switching process can be achieved by complementary neutron scattering experiments at large scale facilities. The project will involve a literature review, preparation of hydrogels, as well as experimental investigations and interpretations of the repeated switching of the stimuli-responsive hydrogels.

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