Self-assembled membranes from bionanoparticle-polymer hybrids

Patrick van Rijn,[1] Nathalie Mougin,[1] Hyunji Park,[1] Axel H. E. Müller[2], Alexander Böker*[1]

[1]DWI an der RWTH Aachen e.V. IPC, RWTH Aachen University, Germany
[2]Makromolekulare Chemie II, University of Bayreuth, Germany

New Bionanoparticles have been prepared by using Horse spleen Ferritin (HSF) as a scaffold for the grafting from of thermo-responsive poly(*N*-isopropyl acrylamide) (PNIPAAm) and photo-crosslinkable (*2*-(dimethyl maleinimido)-*N*-ethyl-acrylamide (DMIAAm) by ATRP [1]. Interfacial surface tension experiments show that the particles are highly surface active, much more than the individual components alone [2]. The newly formed bionanoparticle-polymer hybrids are excellent in stabilizing polar/apolar interfaces and in combination with photo-crosslinking, new materials can be developed for the formation of stable and resilient 2-D membranes and semi-permeable responsive capsules [3] that tolerate mechanical stress and osmotic pressures (Fig. 1).

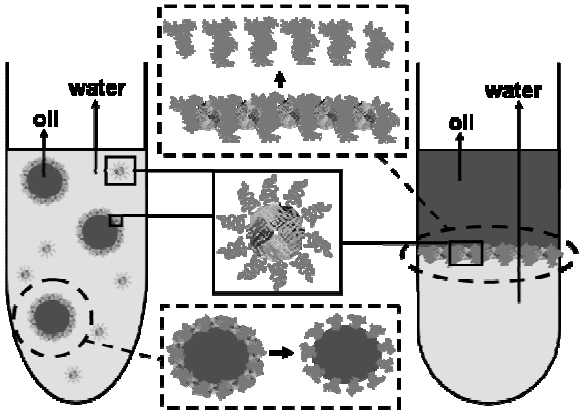

Fig. 1: Schematic representation of the formation of soft capsules and 2-D membranes.

[1]N. C. Mougin, P. van Rijn, H. Park, A.H.E. Müller and A. Böker, *submitted*, (2010).
[2]P. van Rijn, H. Park, N. C. Mougin, A.H.E. Müller and A. Böker, *in preparation*, (2011).
[3]Y. Lin, H. Skaff, A. Böker, A. D. Dinsmore, T. Emrick and T. P. Russell, J. Am. Chem. Soc., **125**, 12690, (2003); P. van Rijn,N. C. Mougin, H. Park, A.H.E. Müller and A. Böker, *in preparation*, (2011).