Swiss Industrial Chemistry Symposium (SICS) 2016 28.10.2016

Cosolvent fractionation of PMOXA-PDMS-PMOXA: bulk separation of triblocks from multiblocks

Samuel Lörcher[1] and Wolfgang Meier[1]

[1] Department of Chemistry, University of Basel, 4054 Basel, Switzerland, Klingelbergstrasse 80,
samuel.loercher@unibas.ch - wolfgang.meier@unibas.ch

The engineering of a broad range of bio-polymer hybrid systems is based on selfassembled polymeric membranes [1]. The self-assembly process of amphiphilic block copolymers into such membranes is influenced by many different factors, like polymer composition, temperature, method and time of polymersome formation. The cationic ring opening polymerization of 2-oxazolines is affected by chain transfer reactions [2], leading to the formation of multiblock copolymers which affect the self-assembly process negatively.

PMOXA-PDMS-PMOXA is one of the most widely used block copolymers for the assembly of polymersomes hosting membrane proteins such as OmpF to yield enzymatic nanoreactors [3]. Fundamental studies [4] and the broad range of applications [1] require functionalized and well-defined polymeric materials. Here, we present a new cosolvent extraction method to overcome the side products formed by chain transfer reactions during the 2-methyl-2-oxazoline polymerization as illustrated in Fig. 1.

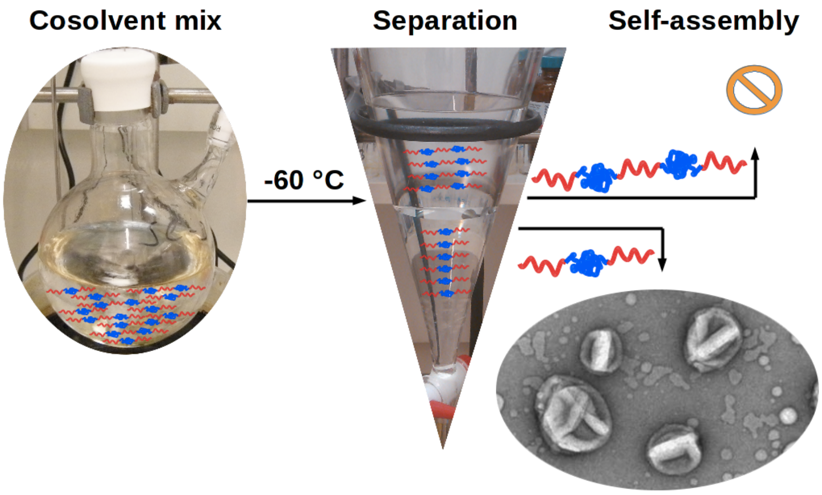

Figure 1. Schematic illustration of the cosolvent extraction enabling the separation polymersome forming triblock copolymers from multiblock copolymers.

[1] Gunkel-Grabole G., Sigg S., Lomora M., Lörcher S., Palivan C.G., Meier W.: *Biomater. Sci. Polymeric 3D nano-architectures for transport and delivery of therapeutically relevant biomacromolecules* **2015**, *3*, 25- 40
[2] Litt, M., Levy, A., Herz, J., 1975. Polymerization of Cyclic Imino Ethers. X. Kinetics, Chain Transfer, and Repolymerization. Journal of Macromolecular Science: Part A - Chemistry 9, 703–727.
[3] Nardin C., Thoeni S., Widmer J., Winterhalter M., Meier W.: *Chem. Commun. Nanoreactors based on (polymerized) ABA-triblock copolymer vesicles,* **2000**, 1433–1434
[4] Itel F., Chami M., Najer A., Lörcher S., Wu D., Dinu I. A., Meier W. P.: *Macromolecules Molecular Organization and Dynamics in Polymersome Membranes: A Lateral Diffusion Study*, **2014**, *47*, 7588-7596