

IMPRS on Multiscale Biosystems

Project description

Title: Sweet traps: using glycol-conjugated polymer brushes for detecting glycan-binding biomolecules.

PI: Prof. Svetlana Santer (UP)

In collaboration with: Prof. P. H. Seeberger (MPIKG).

Project description:

Glyco-conjugated polymers have been shown to provide an effective molecular system to detect and specify small amounts of pathogens such as Gram-negative bacteria, without the time consuming need to grow cultures for enhancing detection efficiency.[1] Multivalency, the ability to occupy several equivalent binding sites of the pathogen/biomolecule, is a key issue here.

In this project, we want to graft conjugated polymers from solid substrates to form so-called polymer brushes.[2] By varying the process parameters of brush synthesis, some control over the orientational degree of freedom, number density and thus the multivalent potency of the glycosides can potentially be achieved. The student is expected to test a series of different brushes that vary systematically in parameters such as grafting density and degree of polymerization, in order to characterize the impact on detection efficiency for pathogens and different glycan-binding proteins. In addition, the brush-like polymer film may be patterned on a sub-micron length scale in order to introduce another parameter to address a specific object.

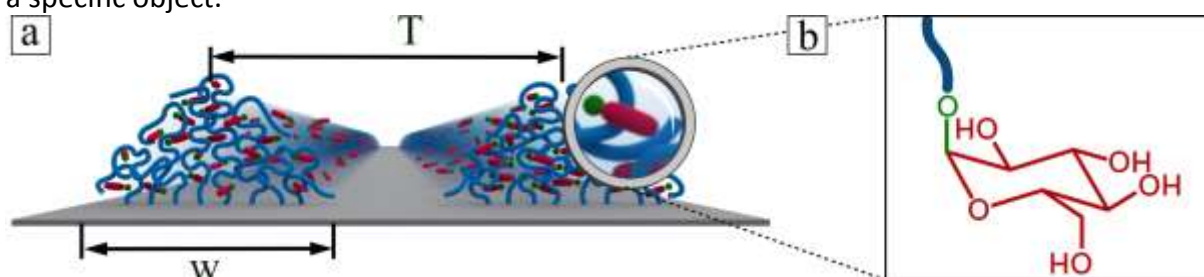


Figure. Scheme of structured polymer brush (a) functionalized with glycosides (b) as side chains. The periodicity, T , and width, w , of the brush nano-pattern can be varied: T between 500nm and 5 μ m, w between 100nm and 1 μ m.

Required background: The prospective student should have a background in chemistry or physical chemistry. Practical experience with analytical and microscopic techniques is advantageous.

Paper to read before the interview:

- (1) Disney, M. D.; Zheng, J.; Swager, T. M.; and Seeberger, P. H. Detection of Bacteria with Carbohydrate-Functionalized Fluorescent Polymers. **2004**. *J. Am. Chem. Soc.* 126:13343–13346.
- (2) Kopyshv, A.; Lomadze, N.; Feldmann, D., Genzer, J.; Santer, S. Making Polymer Brush Photosensitive with Azobenzene Containing Surfactants. **2015** *Polymer* 79: 65-72.

Contact: santer@uni-potsdam.de