Beitrag ID: **19** Typ: **Talk**

# Synthesis and characterization of solvatochromic dye-gradient polymer brushes

*Dienstag, 5. Dezember 2023 11:55 (25 Minuten)*

**Synthesis and characterization of solvatochromic dye-gradient polymer brushes**

Jonah Decker1, Sören Steup2, Sergey I. Druzhinin1, Heiko Ihmels2, Holger Schönherr1*

1 Physical Chemistry I, Department of Chemistry and Biology and Research Center of Micro and Nanochemistry and (Bio)Technology (Cμ), University of Siegen
2 Organic Chemisty II, Department of Chemistry and Biology and Research Center of Micro and Nanochemistry and (Bio)Technology (Cμ), University of Siegen
E-mail: schoenherr@chemie.uni-siegen.de

In the project, the dynamics of wetting of the poly(di(ethyleneglycol) methyl ether methacrylate) (PDEGMA) brushes is studied by analysing the fluorescence dynamics of a solvatochromic reporter dye. In these brushes the dyes are coupled to the polymer chain and probe the local polarity in their vicinity [1]. Hence they can be applied as reporters for the local state of the chain hydration in the brush interior. This allows one to image the wetting dynamics with confocal fluorescence microscopy both with high lateral as well as significantly enhanced axial resolution. To achieve this, poly(di(ethyleneglycol) methyl ether methacrylate) brushes with an overall uniform height were successfully synthesised, containing a solvatochromic dye covalently attached to the brushes in a one-dimensional depth gradient. Two consecutive steps of gradient brush synthesis via surface-initiated activator regenerated by electron transfer atom transfer radical polymerization (SI-ARGET ATRP) were performed with inverse gradient directions to realize this unique brush architecture [2]. Between those two steps, a short segment of a co-monomer, containing the solvatochromic dye covalently attached to di(ethyleneglycol) methyl ether methacrylate (DEGMA) was polymerized. In this contribution, the synthesis and characterization of > 200 nm thick polymer brush systems with a short dye-containing co-monomer segment with a one-dimensional gradient inside will be presented. Fluorescence lifetime imaging microscopy measurements of polymer brushes in dry and wet conditions will also be discussed.

The authors gratefully acknowledge the financial support by the Deutsche Forschungsgemeinschaft (DFG in the SPP 2171, SCHO 1124/8-1) and the University of Siegen.

References

[1] A. Yadigarli, Q. Song,S. I. Druzhinin, H. Schönherr, Beilstein J. Org. Chem. 2019, 15, 2552.
[2] S. Großhans, I. Lilge, H. Schönherr, Macromol. Biosci. 2018, 18 (2), 1700317.

**Hauptautor:** DECKER, Jonah

**Co-Autoren:** Herr STEUP, Sören; Dr. DRUZHININ, Sergey I.; Prof. IHMELS, Heiko; Prof. SCHÖNHERR, Holger

**Vortragende(r):** DECKER, Jonah

**Sitzung Einordnung:** Short Talks