Elucidating the effects of end-groups on polymer brush conformational transitions as probed by fluorescent lifetime imaging microscopy (FLIM)

Conformationally fluorescent polymer brushes offer exciting potential for surface-based sensing of interfacial phenomena.[1-4] In this thesis, the influence of polymer end-group on the conformational transitions (collapsed to swollen) at the 3-phase contact line of an aqueous droplet will be explored.

This will involve:

1. Synthesis of brushes via SI-PET-RAFT methods[5]
2. Integration of fluorophores for conformational fluorescence[1,2]
3. Selective modification of the RAFT end-groups
4. Analysis of swelling transitions around the 3-phase contact line of an aqueous droplet by FLIM
5. Further analysis of brush heights by spectroscopic ellipsometry

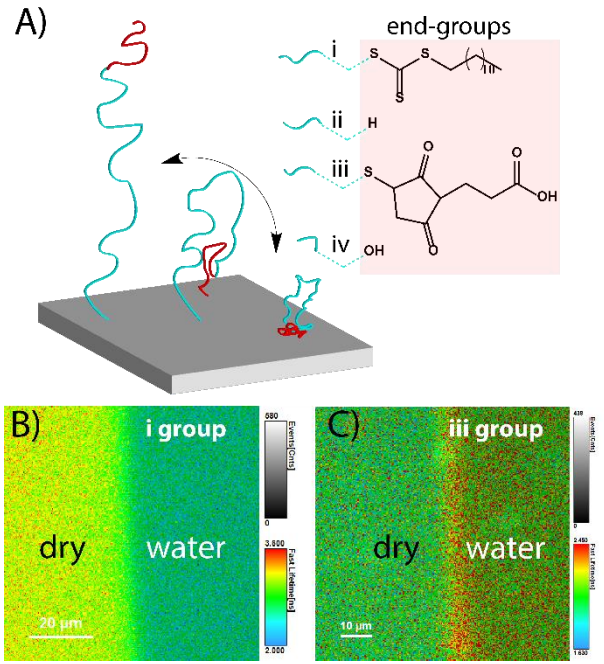

Figure 1: A) Schematic describing the possible end groups of the SI-PET-RAFT polymer chains, along with preliminary FLIM measurements of the edge of an aqueous droplet placed on the conformationally fluorescent brushes with B) hydrophobic and C) hydrophilic end-groups.

Dr. Quinn A. Besford
besford@ipfdd.de

1) Q. A., Besford*, *et al.*, *Angew. Chem. Internat. Ed.* **2021**, *60*, 16600-16606 (**Hot paper**); 2) Q. A., Besford*, *et al.*, *ACS Nano* **2022**, *16*, 3383-3393; 3) Q. A., Besford*, *et al.*, *Molecules* **2022**, *27*, 3043; 4) Q. A., Besford*, *et al.*, *Macromol. Chem. Phys.* **2022**, *2200180*; 5) Fromel, *et al.*, *ACS Appl. Polym. Mater.* **2021**, *3*, 5291-5301.