**Author Contributions**

**Paper I:** AC was responsible for the experimental design together with co-authors, performed the experimental work, analysed the results and wrote the manuscript under supervision of EK and TT. MF and CB contributed to the spectroscopic measurements and analysis of the results and critically reviewed the conclusions.

**Paper II:** AC was responsible for the experimental design together with co-authors, performed the experimental work, analyzed the corresponding results and wrote the manuscript. EK and TT contributed to the experimental planning and critically reviewed the results and conclusions. MF and CB contributed to the spectroscopic measurements and analysis of the results and critically reviewed the conclusions. TH took part in diffusion modeling.

**Paper III:** AC performed the main part of the experimental work, analyzed the results and wrote the manuscript under the supervision of TT and TH. AS performed the viscosity and tensile testing measurements. JS critically reviewed the results and conclusions.

**Paper IV:** AC prepared the samples, performed the FT-IR measurements and AFM imaging, analysed the results together with the co-authors and wrote the manuscript under the supervision of EK and TT. AM performed the filtration measurements and LSJ performed the SEM measurements. TH and HS contributed to the chemical modifications.

**Paper V:** AC performed the AFM experiments, analysed the experimental results and wrote the corresponding part in the manuscript. AM and MN carried out the main part of the experimental work, analysed the results and wrote the manuscript. PL prepared the raw material. TT, KL and AB contributed the experimental planning, critically reviewed the results and conclusions and supervised the writing.