

Supporting Information

Amine end-functionalized poly(2-ethyl-2-oxazoline) as promising coating material for antifouling applications

Lutz Tauhardt,^{1,2} Marion Frant,³ David Pretzel,^{1,2} Matthias Hartlieb,^{1,2} Christian Bücher,³ Gerhard Hildebrand,³ Bernd Schröter,⁴ Christine Weber,^{1,2} Kristian Kempe,^{1,2,6} Michael Gottschaldt,^{1,2} Klaus Liefelth,³ Ulrich S. Schubert*^{1,2,5}

¹Laboratory of Organic and Macromolecular Chemistry (IOMC), Friedrich Schiller University Jena, Humboldtstr. 10, 07743 Jena, Germany.

²Jena Center for Soft Matter (JCSM), Friedrich Schiller University Jena, Philosophenweg 7, 07743 Jena, Germany.

³Institute for Bioprocessing and Analytical Measurement Techniques e.V. (IBA), Rosenhof, 37308 Heilbad Heiligenstadt, Germany.

⁴Institute for Solid State Physics, Friedrich Schiller University Jena, Helmholtzweg 5, 07743 Jena.

⁵Dutch Polymer Institute (DPI), John F. Kennedylaan 2, 5612 AB Eindhoven, The Netherlands.

Corresponding author footnote: Fax. +49 3641 948 202; Email: ulrich.schubert@uni-jena.de

⁶Current address: Department of Chemical and Biomolecular Engineering, The University of Melbourne, Victoria 3010, Australia.

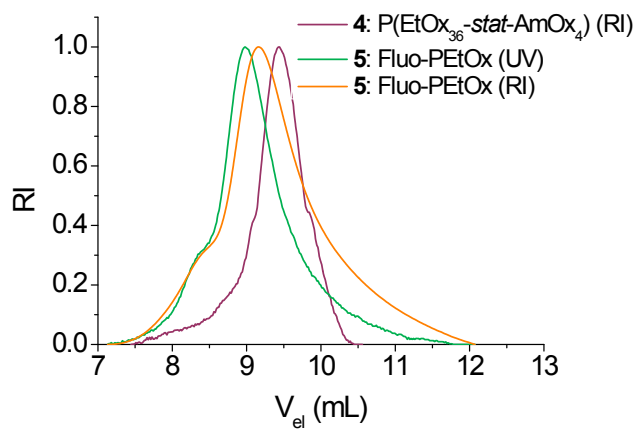


Fig. S1. SEC curves of amine containing POx **4** and Fluo-PEtOx **5** (eluent: CHCl₃/2-propanol/TEA).

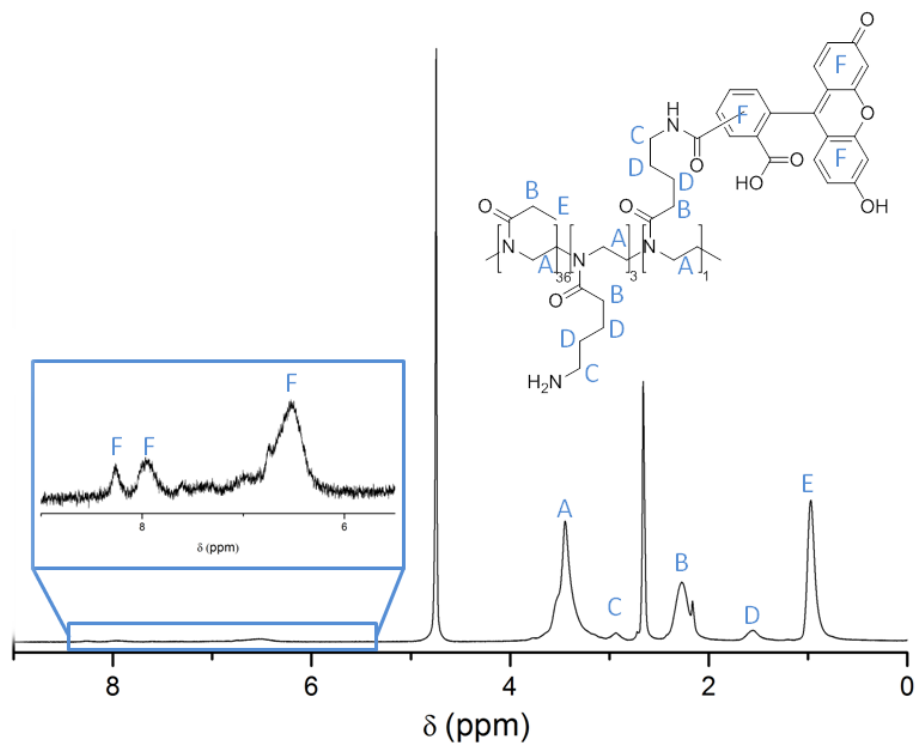


Fig. S2 ¹H NMR spectrum of PETox-FITC (300 MHz, solvent CD₃OD).

Methods and materials

General

Dry acetonitrile, MeOx and methyl tosylate (MeOTs) were obtained from Acros Organics, distilled to dryness over barium oxide (BaO), and stored under nitrogen. Dry *N,N*-dimethylformamide (DMF) was purchased from Acros Organics, (3-glycidyloxypropyl)-trimethoxysilane from ABCR, hydrazine monohydrate and potassium phthalimide from Fluka. Triethylamine was distilled over calcium hydride prior use.

Borofloat 33 glass slides were purchased from Schott (Jena, Germany) and cleaned using a low-pressure oxygen plasma instrument from Diener Electronic (Nagold, Germany). The Initiator Sixty single-mode microwave synthesizer from Biotage, equipped with a noninvasive IR sensor (accuracy: $\pm 2\%$), was used for polymerizations under microwave irradiation. Prior to use, the microwave vials were heated at 110 °C overnight and allowed to cool to room temperature under a nitrogen atmosphere. Proton (^1H) nuclear magnetic resonance (NMR) spectra were recorded on a Bruker AC 300 MHz at 298 K. Chemical shifts are reported in parts per million (ppm, δ scale) relative to the residual signal of the deuterated solvent. Size exclusion chromatographies (SEC) of the PEtOx were measured on a Shimadzu system equipped with a SCL-10A VP system controller, a DGU-14A degasser, a LC-10AD VP pump, a RID-10A refractive index detector and a PSS SDV column running with chloroform, triethylamine (TEA), and 2-propanol (94:4:2) as eluent. The Techlab column oven was set to 50 °C. Molar masses were calculated using a polystyrene (PS) standard. The MALDI-TOF-MS spectra were recorded utilizing an Ultraflex III TOF/TOF (Bruker Daltonics GmbH, Bremen, Germany), equipped with a frequency-tripled Nd:YAG laser, operating at a wavelength of 355 nm. All spectra were measured in the positive reflector mode using *trans*-2-[3-(4-*tert*-butylphenyl)-2-methyl-2-propenylidene]malononitrile (DCTB) with sodium iodide as matrix. XPS measurements were performed on an EA200-ESCA-system (SPECS Surface Nano Analysis GmbH, Berlin, Germany).

X-ray photoelectron spectroscopy (XPS)

XPS investigations were carried out with an EA200-ESCA-system (SPECS) using nonmonochromatic Al K α radiation ($h\nu = 1486$ eV). The samples have been measured as received under constant conditions ($\theta = 0^\circ$). The nitrogen 1s photoemission signals have been background subtracted and smoothed.

Contact angle measurements

Determination of water contact angles has been carried out with a computer controlled contact angle measuring system (DCA20, dataphysics, Germany) using the sessile drop technique (drops of 3 μL). In order to evaluate expected hydration effects of the PEtOx-layers, both dry and swollen samples were characterized. To obtain the latter, the coated glass slides were swollen in distilled water for 30 min. Prior to the determination, excess of water on the surface was removed with pressurized air. The presented contact angles are an average from 15 measurements at 5 different surface points ($n = 45$).