



Supporting Information

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# A general approach to the covalent immobilization of single polymers

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## Experimental

**Materials.** Monodisperse polystyrene standards of molecular weights 223 200, 570 000, 1 877 000 were obtained from Scientific Polymer Products Inc. (Ontario, NY). Poly(2-ethyl-2-oxazoline) (average Mw 500 000) was purchased from Aldrich. Silicon wafers were cleaned in the piranha solution (7:3 v/v concentrated H<sub>2</sub>SO<sub>4</sub>/ 35 wt% H<sub>2</sub>O<sub>2</sub>) for 1 h at 80-90 °C, washed thoroughly with boiling water for 1 h, and dried under a stream of nitrogen. *Caution! Piranha solution reacts violently with many organic compounds; use extreme care when handling it.*

**Instrumentation.** The samples were irradiated with UV light from a Hanovia 450 W medium-pressure Hg lamp in a water-cooled jacket. A Schott Glass WG 280 filter eliminated the short wavelength UV. The lamp reached its full power after ~2 min warm-up to an intensity of 5.0 mW/cm<sup>2</sup> as measured by a model UVX radiometer and UVX-36 sensor manufactured by UVX Inc. (Upland, CA). Atomic force microscopy images were collected on a Nanoscope IIIA (Veeco, Santa Barbara, CA) using a silicon tip in the tapping mode at an oscillating frequency of ~300 KHz.

**Typical procedure for the immobilization of polymer on silicon wafers.** Cleaned silicon wafers were treated for 5 minutes with solutions of PFPA-silane in toluene; the concentrations of which ranged from  $5 \times 10^{-1}$  mg/mL to  $5 \times 10^{-5}$  mg/mL. The wafers were then spin coated at 2000 rpm with a 10 mg/mL polymer solution (PS in toluene, PEOX in chloroform). The samples were irradiated with a medium pressure Hg lamp for 5 minutes followed by removal of the unbound polymer with the corresponding solvent and N<sub>2</sub>-dry.

**The length of a fully stretched polymer is calculated as follows:**<sup>[15-16]</sup>  $L = N \cdot a \cdot \sin(\theta/2)$ , where N, a, and  $\theta$  are the number of C-C bond in the main chain, the C-C bond length (0.154 nm), and C-C-C bond angle ( $109.3^\circ$ ), respectively.