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Degrafting of polymer brushes from substrates enables insight about the brush structure and facilitates surface patterning. ROHAN PATIL, North Carolina State Univ, SALOMON TURGMAN-COHEN, Kettering University, JIRI SROGL, North Carolina State Univ, DOUGLAS KISEROW, US Army Research Office, JAN GENZER, North Carolina State Univ — Polymers end-grafted to surfaces or interfaces, commonly referred to as polymer brushes, enable tailoring physico-chemical properties of material surfaces. Many applications of polymer brushes require information about the molecular weight (MW) and grafting density (GD) of polymer brushes. For brushes synthesized by surface initiated polymerization (SIP) determining these attributes was always a challenge. We have developed a simple method of measuring MW and GD of these systems by degrafting SIP from silica-based surfaces by using tetrabutyl ammonium fluoride (TBAF), which attacks selectively Si-O bonds and enables complete degrafting of poly(methyl methacrylate) (PMMA) brushes from silica based substrates without damaging the backbone. The rate of PMMA degrafting decreases with reaction time and depends on the concentration of TBAF, temperature, and the initial GD of the system. The molecular weight distribution of the degrafted PMMA was measured using size exclusion chromatography. The GD was calculated from known MW and dry thickness of the PMMA brush. Spatial patterns of degrafted regions on the substrate can be prepared by either localizing the TBAF to certain regions or by gradually immersing homogeneous samples into TBAF solution.

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