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Structure of polymer brushes on flat substrates and its dependence on the conditions of the surface-initiated polymerization ROHAN PATIL, JIRI SROGL, North Carolina State Univ, DOUGLAS KISEROW, US Army Research Office, JAN GENZER, North Carolina State Univ — We demonstrate an efficient method of degrafting surface anchored poly(methyl methacrylate) brushes using tetra butyl ammonium fluoride (TBAF). The grafted polymers are grown using standard atom transfer radical polymerization method which provides good control by varying the catalyst ratio ($Cu^{(II)}$:$Cu^{(I)}$). The sample surface has been characterized before and after degrafting by means of X-ray photoelectron spectroscopy, ellipsometry, and time-of-flight secondary ion mass spectrometry. The degrafted polymer has been characterized using highly sensitive size exclusion chromatography, which provided information about the complete molecular weight distribution. The grafting density of PMMA chains is calculated as 0.517 chains/nm^2. The study of the dependence of the grafting density on the ATRP inhibitor/catalyst ratio evidences to an effect of early termination of the growing chains when a lower control on the polymerization step is exercised. Control of the degrafting process is provided by tuning time, temperature, concentration of the TBAF, which - in conjunction with spatial control - allows for the creation of polymer brush patterns and surface gradients.

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