Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

On-demand degrafting of polymer brushes prepared by controlled radical polymerization on flat silica substrates ROHAN PATIL, JIRI SROGL, North Carolina State Univ, DOUGLAS KISEROW, U.S. Army Research Office, JAN GENZER, North Carolina State Univ — Polymer brush degrafting refers to the removal of grafted polymer chains from the substrate without harming the polymer chemical structure. We grow poly(methyl methacrylate) (PMMA) brushes on flat silicon substrates using atom transfer radical polymerization (ATRP) and remove them from the surface by exposing the samples to tetrabutyl ammonium fluoride. We then analyze the polymer molecular weight of degrafted PMMA chains by size exclusion chromatography. The kinetics of PMMA brush degrafting exhibits double exponential behavior suggesting a transition from 'brush' to 'mushroom' regime. The dry brush thickness increases initially with increasing polymerization time. At longer reaction times, the thickness starts to plateau due to loss in the living nature of ATRP. We examine the relationship between the brush dry thickness and molecular weight and show that grafting density of the PMMA brush does not remain constant over the course of polymerization but reduces with time.

Rohan Patil
North Carolina State Univ

Date submitted: 13 Nov 2013 Electronic form version 1.4