Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Temperature-responsive polymers and brushes with tunable onset of response THERESA FOLEY, Penn State University, KIRIL EFIMENKO, North Carolina State University, JAN GENZER, North Carolina State University, EVANGELOS MANIAS, Materials Science and Engineering, Penn State University — Temperature-responsive polymers are of high interest in the scientific field of stimuli responsive materials, in particular water soluble polymers with a response at $\sim 36.5^o$C. However, difficulties in tailoring this T-response, as illustrated for example from studies of PNIPAM in numerous functionalized and copolymer forms, has hampered their proliferation. Here we present a systematic series of temperature-responsive polymers, which were designed, synthesized, and studied, and we show that we can tailor with high sensitivity their onset of T-response via the design of their monomer. Specifically, we demonstrate lower critical solution temperature (LCST) in water finely tuned between 5 and 70^oC, by controlling the hydrophilic/hydrophobic balance in the monomer (closely following predictions of phase behavior theories). In addition, we will also show that these polymers maintain their T-responsive characteristics when end-tethered to solid surfaces, over a wide range of grafting densities in combinatorial brushes. This approach allows for controlling contact angle, adhesion and tackiness as a function of temperature.

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Date submitted: 30 Nov 2005 Electronic form version 1.4