

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Patterning of microgel particles on polymer surfaces controlled by autophobicity and interfacial tension ARIF GOZEN, BIN WEI, RICHARD SPONTAK, JAN GENZER, North Carolina State University, PAUL GURR, DAVID SOLOMON, GREG QIAO, University of Melbourne — We investigate the thermal response of microgel particles (μ GPs) composed of a cross-linked divinylbenzene core and poly(methyl methacrylate) (PMMA) arms as they segregate from PMMA homopolymer due to autophobicity. When in contact with a free surface, the particles migrate to the PMMA surface but remain inside the PMMA. When a thin film of polystyrene (PS) is placed on top of a PMMA/ μ GP film, the μ GPs segregate to and thus roughen the PMMA/PS interface, as evidenced by AFM analysis. We attribute this behavior to a change in surface vs. interfacial energetics. Specifically, while the high surface energy of the native PMMA film keeps the particles inside the bulk PMMA, placing a thin PS layer on top of the PMMA/ μ GP film decreases the PMMA/PS interfacial tension by about an order of magnitude, which consequently permits segregation of the μ GPs to the PMMA/PS interface. We follow the segregation kinetics of core-shell μ GPs with and without fluorescent tagging, and we demonstrate the possibility of patterning the segregated μ GPs by contacting a corrugated poly(dimethylsiloxane) (PDMS) layer to PMMA/ μ GP films. Regions of the PMMA/ μ GP film touching the PDMS layer exhibit μ GP segregation, while non-contacted regions appear featureless.

Richard Spontak
North Carolina State University

Date submitted: 22 Nov 2006

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