Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Surface-Initiated ARGET ATRP and Characterization of Thermoplastic Elastomer Montomorillonite Composites[1] JEFFREY EASLEY, AMANDA BECK, CHRISTOPHER ELLISON, University of Texas at Austin — Polymer nanocomposites, with enhanced properties as compared to their bulk polymer counterparts, are becoming more prominent in advanced material applications. Here we report the synthesis of poly(n-butyl acrylate-b-styrene) (PBA-b-PS) from the surface of functionalized montmorillonite clay via activators regenerated by electron transfer (ARGET) atom transfer radical polymerization (ATRP). The ARGET mechanism allows for a substantial reduction in the amount of transition metal catalyst required. It also exhibits potential for eventual scale-up and the industrial adoption of ATRP as a versatile method for producing polymers with well-defined compositions and functionalities. The composite materials resemble traditional thermoplastic elastomer triblock copolymers, with the clay platelets dividing the central, rubbery PBA block. We used SAXS, NMR, and TEM to characterize the composition and structure of the composites. The resulting material properties were measured by tensile testing, dynamic mechanical analysis, and TGA. We anticipate the composites to have exceptional barrier properties due to the high degree of clay dispersion, which may lead to applications as recyclable packaging materials.

[1]Financial support from The Welch Foundation (Grant #F-1709).

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Date submitted: 23 Nov 2009 Electronic form version 1.4