Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Thermodynamic Characteristics of Poly(cyclohexylethylene-*b*-ethylene-*co*-ethylethylene) Block Copolymers AMEARA MANSOUR, LEAH JOHNSON, TIMOTHY LODGE, FRANK BATES, University of Minnesota — A series of poly(cyclohexylethylene-*b*-ethylene-*co*-ethylethylene) (C-E/E_E) diblock copolymers containing approximately 50% by volume glassy C blocks and varying fraction (x) of E_E repeat units, $0.07 \leq x \leq 0.90$, was synthesized by anionic polymerization and catalytic hydrogenation. The effects of ethyl branch content on the melt state segment-segment (χ) interaction parameter and soft (E/E_E) block crystallinity will be presented. The percent crystallinity ranged from approximately 30% at $x = 0.07$ to 0% at about $x \geq 0.30$, while the melting temperature changed from 101 $^\circ$C at $x = 0.07$ to 44 $^\circ$C at $x = 0.28$. Dynamic mechanical spectroscopy was employed to determine the order-disorder transition (ODT) temperatures, from which χ was calculated assuming the mean-field prediction $(\chi N_n)_{ODT} = 10.5$. Previously published results for the temperature dependent binary interaction parameters for C-E ($x = 0.07$), C-E_E ($x = 0.90$), and E-E_E ($x = 0.07$ and $x = 0.90$) fail to account for the quantitative x dependence of χ, based on a simple binary interaction model.

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Date submitted: 17 Nov 2009 Electronic form version 1.4