

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Block Copolymer Surfactancy: Swollen Micelles and Interfacial Tensions in Immiscible A/B Blends with AB Copolymer KWANHO CHANG, DAVID MORSE, University of Minnesota — We consider the interfacial tension between immiscible A and B homopolymers mixed with an AB diblock copolymer, in which the copolymer forms micelles in the A-rich phase, and in which the micelles generally swell with B homopolymer in the micelle core. We have carried out self-consistent field theory (SCFT) calculations of the free energy of swollen micelles and of the macroscopic interface between A- and B-rich phases, while equating the chemical potentials used both calculations. Nearly balanced copolymer surfactants, which form saturated interfaces with small spontaneous curvatures, tend to form highly swollen micelles, and also lead to small macroscopic interfacial tension. Previous theoretical analyses of the macroscopic interfacial tension obtained when micelles are present have completely neglected swelling of the micelles, and made some qualitative errors as a result. The relationship between interfacial tension and micelle structure is most easily understood within the context of the Helfrich theory of interfacial bending elasticity, with bending elastic parameters obtained from SCFT.

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Date submitted: 16 Dec 2004

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