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Polymer Surface Modification by Adsorbing Functional Block Copolymer from a Supercritical Fluid[1] YONG CHEN, Columbia University, JEIRAN JAHANI, Northeastern University, JEFFREY KOBERSTEIN, Columbia University — We demonstrate that a polymer surface may be functionalized by adsorption of a monolayer of poly(styrene-b-tert butyl acrylate) (PS-b-tBA) copolymer containing protected carboxylic acid functional groups. The deposited P(S-b-tBA) films spontaneously form bilayer structures on polystyrene substrates from a supercritical fluid mixture of scCO2 and hexane. The modified polystyrene substrates are characterized by AFM, contact angle, and angle-dependent X-ray photoelectron spectroscopy. These measurements show that the surface of the modified polystyrene substrate is flat with the PS part of the P(S-b-tBA) entangled with polystyrene substrate and the PtBA block presented at the air interface. Monolayer to submonolayer coverage is produced as the PtBA layer thickness increases from ca. 0.22 nm at 8 MPa to a maximum of ca. 2 nm for pressures of 18 MPa and higher. The tert-butyl ester groups on the polyacrylate blocks can be deprotected to form surface carboxylic acid groups for further functionalization by electroless deposition of nickel and bioconjugation with YRGDS.

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