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Direct Fluorescence Measurements of Polymer Surface Diffusion and Intramolecular Rearrangements JANET WONG, LIANG HONG, SUNG CHUL BAE, STEVE GRANICK, University of Illinois at Urbana-Champaign — A picture is emerging, based on few-molecule fluorescence spectroscopy, of polymer surface dynamics at the solid-liquid interface. Here we describe experiments using fluorescence correlation spectroscopy (FCS) and Förster Resonance Energy Transfer (FRET) of polystyrene (PS) and polyethylene oxide (PEO) adsorbed from good solvent. In-plane translational diffusion of these polymers was measured as a function of molecular weight and surface coverage. We show the surface diffusion (D) decreases with molecular weight in a power law fashion with exponent equal to -3/2 in the regime of dilute surface coverage. The surface coverage (Γ) effect on D is even more intriguing, with an initial increase with $\Gamma$and then decreases after a critical Γ is achieved. Exploring the hypothesis that the change in D reflects chain conformational change as Γ increases, experiments are underway that employ FRET to quantify the chain end-to-end separation.

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