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New paradigm for stabilization of liquid polymer films on solids¹ TAD KOGA, NAISHENG JIANG, JIAXUN WANG, XIAOYU DI, JUSTIN CHE-UNG, MAYA ENDOH, Stony Brook University — We report that wetting/dewetting behavior of liquid polymer films on solids can be controlled by nanoscale architectures of polymer chains irreversibly adsorbed on the impenetrable surfaces. Monodisperse polystyrene (PS) ultrathin films (20 nm in thickness) with different molecular weights on silicon (Si) substrates with a natural amorphous Si dioxide layer were used as models. The PS thin films were annealed at high temperatures at T>Tg (Tg is the bulk glass transition temperature) for several days, and the surface structures were studied by using optical and atomic force microscopes. At the same time, the annealed PS films were further leached with a good solvent and the residue films (i.e., irreversibly adsorbed layers) were characterized by x-ray reflectivity. The experimental data reveals a strong correlation between the conformations of the adsorbed polymer chains and the stability of the liquid films on top.

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