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Preparation and Friction Property of Dendritic Thin Film QING ZHANG, LYNDEN ARCHER, Cornell University — To investigate the effect of film structure on their friction properties, thin films with dendritic structure were prepared on silicon surfaces by step-growth propagation, and their friction properties were studied by AFM. The molecular structure of grafted layer was adjusted by controlling the generations of grafting reaction and the concentration of functional groups on the surface. X-ray Photoelectron Spectroscopy measurements indicate systematic increased packing density of grafted dendritic layer as the generation of reaction and the functional group concentration increases. These structural variations were found to strongly influence their friction properties. The friction coefficients were found to increase with increasing the packing density of the grafted dendritic layer, and in the dynamic friction measurement (friction as a function of sliding velocity), a plateau was found for grafted layers with high packing densities. Analysis using a thermally activated model suggests that the lower mobility of molecules in densely packed films leads to longer relaxation time and higher friction coefficient compared with molecules in loosely packed layers.

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