Supporting Information

Tribology of Monolayer Films: Comparison between n-Alkanethiols on Gold and n-Alkyl Trichlorosilanes on Silicon

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Electrochemical Impedance Spectra. Figure S1 shows electrochemical impedance spectra (Bode plots) for n-alkanethiolate SAMs on gold in 0.1 M Na$_2$SO$_4$ (aq), 1 mM K$_3$Fe(CN)$_6$, and 1 mM K$_4$Fe(CN)$_6$. The monolayers were assembled for at least 24 h in 1 mM solutions of the thiol adsorbate. Curves represent fits of the spectra to a Randle’s equivalent circuit model in which the solution resistance, film capacitance, and film resistance can all be determined. At low frequencies, the slow alternation of potential allows sufficient time for ions to penetrate defects within SAM; thus, the SAM often functions as a resistor at these low frequencies. The capacitive properties of the film can be determined at intermediate frequencies where the SAM behaves as a dielectric, indicated by a characteristic slope of -1 on the Bode plot. At high frequencies the resistance of the solution is characterized, as the ions do not have sufficient time to
interact with the film due to the rapid alternation of potential. These spectra demonstrate well-formed monolayers prior to tribometric testing and provide a baseline of comparison for any deformation imparted to the monolayer by the tribometric testing procedure.

Figure S1. Electrochemical impedance spectra (Bode plots) obtained prior to tribometric testing for alkanethiolate SAMs on gold in 0.1 M Na$_2$SO$_4$ (aq), 1 mM K$_3$Fe(CN)$_6$, and 1 mM K$_4$Fe(CN)$_6$. Curves represent fits of the spectra to a Randle’s equivalent circuit model in which the solution resistance, film capacitance, and film resistance can all be determined.