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**Effect of headgroup-substrate interactions on the thermal behavior of long-chain amphiphiles** SARANSHU SINGLA, HE ZHU, Graduate Student, ALI DHINOJWALA, Professor — The structure of amphiphilic molecules at liquid/solid and solid/solid interfaces is relevant in understanding lubrication, colloid stabilization, chromatography, and nucleation. Here, we characterize the interfacial structures of long chain amphiphilic molecules with different head groups (OH, COOH, $NH_2$) using interface-sensitive sum frequency generation (SFG) spectroscopy. The behavior of these self-assembled monolayers (SAMs) on sapphire substrate is recorded in situ as a function of temperature (above and below bulk $T_m$) using SFG. Previous studies using synchrotron X-ray reflectivity and SFG show that the melting point of an ordered hexadecanol monolayer is around 30C above its bulk $T_m$. The thermal stability of the monolayer is explained due to strong hydrogen bonding interactions between the head-group and the sapphire substrate. The strength of these hydrogen-bonding interactions between substrate and different head groups is calculated using the Badger-Bauer equation. Below $T_m$, the ordered monolayer influenced the structure of the interfacial crystalline layer, and the transition from monolayer to the bulk crystalline phases. The results with different head groups will be presented.

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