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Atomic force microscopy measurements of topography in dotriacontane films adsorbed on SiO_2

Thin films of alkane molecules (chemical formula C_nH_{2n+2}) are of particular research interest in studies of lubrication on the microscopic level. On one hand, alkane molecules serve as a simpler model for more complex polymers used in coatings, adhesives and electronic devices. On the other hand, alkane molecules are the primary constituents of commercial lubricants. Knowledge of the structure of a thin film of alkane molecules could lead to a better understanding of lubrication on the microscopic level. In our study, we have selected to study the alkane molecule dotriacontane (chemical formula $C_{32}H_{66}$). We have chosen to use the technique of Atomic Force Microscopy (AFM) to study our dotriacontane films. AFM is a technique that was developed in 1986 which is able to determine the topography of films on a nano-scale, in particular our dotriacontane films. AFM utilizes a sharp tip that slides across the surface of our film, detecting the various small changes in height. Using this technique, we can determine the structure of dotriacontane films deposited from a heptane solution onto SiO_2 coated wafers. We find evidence that there are 1 to 2 layers of molecules with their long-axis parallel to the plane of the surface, followed by a single layer of molecules with their long-axis perpendicular to the plane of surface. In addition, we have evidence of islands consisting of more than one perpendicular layer.