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The Acoustic Characterization of the Hydrophobic and Hydrophilic Films XIAOHUA WANG, XIN WANG, RODOLFO FERNANDEZ, MINGDI YAN, ANDRES LA ROSA, Portland State University — In living systems, essential water-related phenomena occur in restricted geometries. The stability of biological systems is controlled by the subtle hydrophilic-hydrophobic interplay, which makes their study of paramount importance. However, a limitation in current experimental strategies is that only the forces acting on the probe are sensed, the effects on the substrate and its absorbed layer are missed. Herein we introduce a novel acoustic-based technique able to simultaneously and independently monitor the effects that surface interactions exert on both the probe and sample. Our homemade shear force/acoustic microscope comprises a piezoelectric tuning fork (to which a gold tip is attached) and an acoustic transducer (placed underneath the substrate). While the tip is laterally oscillating and brought into the adsorbed layer, both the ultrasonic waves generated at the fluid-like layer and the damping effect on the tip are detected as a function of the tip-sample separation. Polymer samples with tailor made hydrophilic/hydrophobic characteristics are analyzed, as a previous step towards the acoustic characterization of protein-sugar molecular interactions.

Xiaohua Wang
Portland State University

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