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Deducing 2D Crystal Structure at the Solid/Liquid Interface with Atomic Resolution by Combined STM and SFG Study ARTHUR MCCLELLAND, University of Michigan, Applied Physics Program, SEOKHOON AHN, ADAM J. MATZGER, ZHAN CHEN, University of Michigan, Chemistry Department — Supplemented by computed models, Scanning Tunneling Microscopy (STM) can provide detailed structure of 2D crystals formed at the liquid/solid interface with atomic resolution. However, some structural information such as functional group orientations in such 2D crystals needs to be tested experimentally to ensure the accuracy of the deduced structures. Due to the limited sensitivity, many other experimental techniques such as Raman and infrared spectroscopy have not been allowed to provide such structural information of 2D crystals. Here we showed that Sum Frequency Generation Vibrational Spectroscopy (SFG) can measure average orientation of functional groups in such 2D crystals, or physisorbed monolayers, providing key experimental data to aid in the modeling and interpretation of the STM images. The usefulness of combining these two techniques is demonstrated with a phthalate diesters monolayer formed at the 1-phenyloctane/ highly oriented pyrolytic graphite (HOPG) interface. The spatial orientation of the ester C=O of the monolayer was successfully determined using SFG.

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