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**Unraveling Molecular Structure in Stern Layer at Charged Water Interface using sum-frequency vibrational spectroscopy** YU-CHIEH WEN, Institute of Physics, Academia Sinica, SHUAI ZHA, SHANSHAN YANG, CHUAN-SHAN TIAN, Department of Physics, Fudan University, Y. RON SHEN, Department of Physics, University of California, Berkeley, California — Charged aqueous interfaces, such as membrane/water and electrochemical interfaces, are essential in many chemical, biological, and environmental processes. Interactions between heterogeneous interfacial molecules and the consequent molecular network dictate properties and functions of the interfaces; however, the microscopic-level picture of the charged water interfaces remains substantially unclear. Here we demonstrate probing of the molecular structure in Stern layer at aqueous interfaces using sum-frequency vibrational spectroscopy. We show that at ionic surfactant/water interfaces, the hydrogen- (H-)bonding strength and network in the Stern layer depend sensitively on conformation and ionization of the surfactants, suggesting a relevant influence of the surfactant-water charge transfer. In addition, ion adsorption to the interface is shown to distort the interfacial water structure. Our study offers exciting opportunities to acquire microscopic insights into interfaces for catalytic and electrochemical applications.

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