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**Study of Hydrophobic Water Interfaces with Phase-sensitive Sum-frequency Vibrational Spectroscopy**[1] CHUANSHAN TIAN, Y. RON SHEN, UC Berkeley — Self-assembled monolayer of octadecyltrichlorosilane (OTS) on fused silica has been used extensively as a representative hydrophobic surface in study of water/hydrophobic interfaces. However, the interfacial water structure and how it changes upon solvated ions are not clear. We have carried out a study on OTS/water interface using the newly developed phase-sensitive sum-frequency vibrational spectroscopy (PS-SFVS). It allows measurement of both real and imaginary parts of the surface spectral response with the latter playing a role equivalent to absorption and emission coefficients and provides information on net polar-orientations of various interfacial water species contributing to the different parts of the spectrum. The result shows that at low pH (pH$\sim$2), water molecules in both ice-like and liquid-like region have weak net polar-orientations with H pointing towards the liquid. At high pH (pH$\sim$11), they are well aligned with H pointing to the solid substrate. It is due to that OTS/silica is negatively charged at high pH because of the adsorption of $OH^-$ ions on methyl groups of OTS, so that the surface field will reorient part of the interfacial water molecules.

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