

Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Vibrational Spectroscopy of Alcohol/ Silica Interfaces¹ WEITAO LIU, LUNING ZHANG, Y. RON SHEN, Department of Physics, University of California, Berkeley, CA 94720 — Sum-frequency vibrational spectroscopy was used to probe alcohol/silica interfaces in order to study how methanol, ethanol, and 1- and 2-propanol molecules orient at the interfaces. It was found that in the CH stretch range, the symmetric CH₃ peaks of all alcohols decreased comparing with the air/liquid interface, while the spectra of ethanol and propanol exhibited prominent antisymmetric CH₃ peaks. The results can be understood by knowing that the first interfacial monolayer of alcohol molecules must adsorb with their OH terminal on the hydrophilic silica and the CH₃ terminal toward liquid, but the adjacent less ordered alcohol monolayer should have the reverse orientation. Because the CH₃ groups of the two monolayers are oppositely oriented, their symmetric stretch modes tend to cancel each other in SFG, but the antisymmetric stretch modes generally do not. In the case of methanol, the antisymmetric stretch is intrinsically weak in the sum-frequency spectra, making the overall spectra very weak.

¹This work was supported by the National Science Foundation Science and Technology Center of Advanced Materials for Purification of Water with Systems (Water CAMPWS).

Luning Zhang
Department of Physics, University of California, Berkeley, CA 94720

Date submitted: 01 Dec 2004

Electronic form version 1.4