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Surfaces of alcohol-water mixtures studied by sum-frequency generation vibrational spectroscopy JAEHO SUNG, KYUNGSU PARK, DOSEOK KIM, Department of Physics and Interdisciplinary Program of Integrated Biotechnology, Sogang University, Seoul 121-742 Korea — Sum frequency generation vibrational spectroscopy in the CH_x stretch vibration range used to investigate the surface of binary mixtures of water and short chain alcohols (methanol, ethanol, and propanol) at the air/liquid interface. It was found that the sum frequency signals from mixtures at low alcohol concentration are larger than that of pure alcohols. For example, the signal from a propanol mixture surface at 0.1 bulk mole fraction was $\sim$3 times larger than that from a pure propanol surface. On the other hand, the ratio between the sum-frequency signals taken at different polarization combinations was found to be constant within experimental errors as the bulk alcohol concentration was changed. This suggested that the orientation of surface alcohol molecules does not vary appreciably with the change of concentration, and that the origin of the signal enhancement is mainly due to the increase in the surface number density of alcohol molecules contributing to the sum-frequency signal for the alcohol/water mixture as compared to the pure alcohol surface.

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