

## **421e Investigation of Solid/Liquid Interfaces by Sum-Frequency Spectroscopy: Nitrile Adsorption and Hydrogenation on Model Supports and Catalysts**

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Sum-Frequency spectroscopy (SFS) is a relatively new technique that is increasingly being utilized to investigate so-called “buried interfaces”. The power of the non-linear optical approach lies in the ability to selectively probe interfacial molecular vibrational properties, even in the presence of significant bulk phase species with similar (or identical) vibrational signatures. In this study, SFS has been used to probe the interface between model supports (Al<sub>2</sub>O<sub>3</sub>, CaF<sub>2</sub> coated with Al<sub>2</sub>O<sub>3</sub> and CaF<sub>2</sub> coated with SiO<sub>2</sub>) and liquid mixtures consisting of nitriles (e.g., acetonitrile, butyronitrile) in ethanol and hexane. Vibrational features associated with both CN stretching (ca 2250 cm<sup>-1</sup>) and C-H stretching (2800-3000 cm<sup>-1</sup>) are observed for adsorbed nitriles. In some cases the C-H stretching vibrations have also been probed using various polarization combinations of the sum frequency, visible and infrared beams in order to determine the orientation of the nitriles with respect to the surface. Finally, an attempt has been made to attain quantitative information about the adsorption isotherms of these nitriles on the various supports.