



第222回触媒化学研究センター談話会

演題 : Effects of reorientation and surface anisotropy on 2nd order nonlinear susceptibilities

講演者 : Dr. Robert Walker, Associate Professor
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会場 : 北海道大学理学部N-308

主催 : 日本分析化学会北海道支部

共催 : 電気化学会北海道支部・触媒化学研究センター

Over the past two decades, vibrational sum frequency spectroscopy (VSFS) has emerged as one of the premier methods for probing molecular structure and chemical properties of surfaces. This optical technique has proven particularly effective in studies of liquid surfaces, where the isotropic nature of the liquid limits the nonlinear response only to that narrow region influenced by interfacial anisotropy. A VSFS experiment requires that an oscillating IR field match an allowed vibrational resonance and that an oscillating visible field stimulate an anti-Stokes transition thus generating the detected signal at the sum of $\omega_{\text{IR}} + \omega_{\text{vis}}$. Conventional wisdom requires that in order to be observable in a VSFS spectrum, the molecular vibrations being probed must be both IR and Raman active. Furthermore, most treatments of the VSFS response assume that the IR and Raman events occur simultaneously.

The first part of this seminar will present results from recent VSFS experiments examining organization within monolayers formed from constitutional isomers of soluble and insoluble alcohol monomers

adsorbed to the air/water interface. Comparison of vibrational spectra from 1-, 2- and 3- position alcohol isomers show that surface coverage and monomer structure reflect a subtle balance between attractive chain-chain interactions and hydrophobic forces between the short alkyl segments and the water subphase. The latter part of the seminar will begin to examine critically some of the assumptions that lie behind conventional interpretations of VSFS data and the consequences for quantities such as calculated functional group orientations. Specifically, situations are considered when the IR and Raman steps in a VSFS response do not occur simultaneously and the role that reorientation can have on band intensities acquired under different polarization conditions. Also considered are the factors that give rise to large 2nd order nonlinear responses from molecules having local inversion symmetry.

《連絡先》

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