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Photothermal microfluidic cantilever deflection spectroscopy reflecting clustering mechanism of ethanol water mixtures MARYAM GHORAISHI, JOHN HAWK, THOMAS THUNDAT, University of Alberta — Aqueous mixture of alcohol is a typical prototype for biomolecules, micelle formation, and structural stability of proteins. Therefore, Short chain alcohols such as EtOH have been used as a simple model for understanding of more complex aqueous biomolecules. Here we study vibrational energy peaks of EtOH water binary mixtures using micromechanical calorimetric spectroscopy using bimaterial microfluidic cantilevers (BMC). The IR spectra of EtOH-water are experimentally collected employing a BMC as concentration of EtOH changes from 20–100 wt%. As concentration of EtOH varies in the mixture, considerable shifts in the wavenumber at IR absorption peak maxima are reported. The experimentally measured shifts in the wavenumber at IR absorption peak maxima are related to changes in dipole moment (μ) of EtOH at different concentration. The relationship between IR absorption wavenumber for both anti and gauche conformers of EtOH, and inverse dipole moment, $1/\mu$, of EtOH at different concentrations follows a power law dependence. Our technique offers a platform to investigate dipole effect on molecular vibrations of mixtures in confined picoliter volumes, previously unexplored with other analytical techniques due to limitations of volume under study.

Maryam Ghoraishi
University of Alberta

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