Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Detection of internal molecular structural motions using anisotropic spectroscopy[1] ROHIT SINGH, DEEPU GEORGE, Department of Physics, University at Buffalo, SUNY, TIMOTHY KORTER, Department of Chemistry, Syracuse University, ANDREA MARKELZ, Department of Physics, University at Buffalo, SUNY —
The far infrared spectroscopy of molecular crystals reveals both intra and inter molecular vibrational modes [1,2]. With the significant increase in complexity of structures, one finds increasing overlap in the internal modes. As an overall strategy to measure the correlated structural motions in protein, we use anisotropic and birefringent behavior of molecular crystals to develop a new technique called MOSTS (Modulated Orientation Sensitive THz Spectroscopy). We achieve high sensitivity and mode separation by using single molecular crystal such as sucrose and rapid modulation of the relative alignment of the terahertz polarization and the crystal axes by rotating the sample. By locking into the signal at the rotation frequency we determine the polarization sensitive signal and map out the optically active vibrational resonances. To illustrate the technique we compare our measured spectra with the calculated and find a close agreement.

[1] D.G. Allis, J.A. Zeitler, P.F.Taday and T.M.Korter, Chem. Phys. Lett., 463, 84 (2008).
[2] P.U. Jepsen and J.C. Stewart, Chem. Phys. Lett., 442, 275 (2007).

[1]NSF MRI[2] grant DBI2959989.

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Date submitted: 21 Nov 2011 Electronic form version 1.4