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Optical Response of Molecular Crystals to Non-hydrostatic Compression in a Diamond Anvil Cell Experiments¹
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High pressure response of molecular crystals is not as well understood as the response of covalent or ionic crystals. Because molecular crystals are highly compressible, small variations in applied stresses result in large intermolecular changes. Additionally, low symmetries, characteristic of molecular crystals, result in significant deformation under static pressure loading. Hence, an understanding and controlling of non-hydrostatic effects are important for examining molecular crystals. Several examples will be presented to show the significance of non-hydrostaticity on the underlying molecular mechanisms in a diamond anvil cell experiments. In particular, we will present our work on selected molecular crystals to highlight the role of non-hydrostaticity on: (i) structural phase transitions, (ii) changes in electronic structure, (iii) formation of structural defects, and (iv) solid state reactivity. Finally, we will demonstrate a relevance of non-hydrostatic compression to shock wave experiments. Work supported by DOE and ONR.

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