

## Optical Properties of Tetrahydrofuran Clathrate Hydrates at Terahertz Frequencies

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**Abstract :** Terahertz time-domain spectroscopy (THz-TDS) was used to observe the THF clathrate hydrate system with dosage of polyvinylpyrrolidone (PVP) with three different average molecular weights (10,000 g/mol, 40,000 g/mol, 360,000 g/mol). Distinct footprints of phase transition in the THz region (0.4 - 2.2 THz) were analyzed and absorption coefficients and complex refractive indices are obtained and compared in the temperature range of 253 K to 288 K. Along with the optical properties, ring breathing and stretching modes for different molecular weights of PVP in THF hydrate are analyzed by Raman spectroscopy.

**Keywords :** clathrate hydrate, terahertz, polyvinylpyrrolidone (PVP), THz-TDS, inhibitor

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