EXPLORING THE SOLID STATE PHASE TRANSITION IN DL-NORVALINE WITH TERAHERTZ SPECTROSCOPY

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DL-Norvaline is a molecular crystal at room temperature and it undergoes a phase transition when cooled below 190 *K*. This phase transition is believed to be Martensitic. We investigate this phase transition by measuring its terahertz (THz) spectrum over a range of temperatures. Temperature-dependent THz time-domain spectroscopy (THz-TDS) measurements reveal that the transition temperature ($T_{\beta\rightarrow\alpha}$) is 190 *K*. The influence of nucleation seeds was analyzed by determining the $T_{\beta\rightarrow\alpha}$ of molecular crystals with varying grain size. Grains of 5 μm or less result in a lower transition temperature ($T_{\beta\rightarrow\alpha}$ = 180 *K*) compared to larger grains of 125–250 μm ($T_{\beta\rightarrow\alpha}$ = 190 *K*). Additionally, we gain insight into the physical process of the phase transition *via* temperature-dependent THz-TDS spectra of doped and mixed molecular crystals. The addition of molecular dopants, which differ from DL-norvaline only at the end of the side chain which resides in the hydrophobic layers of the crystal, decreases $T_{\beta\rightarrow\alpha}$. This is consistent with a solid-solid phase transition in which the unit cell shifts along this hydrophobic layer, and it leads us to believe that the phase transition in DL-norvaline is Martensitic in nature.