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Phonon

Mode Transformation across the Orthohombic-Tetragonal Phase Transition in a Lead-Iodide Perovskite $CH_3NH_3PbI_3$: a Terahertz Time-Domain Spectroscopy Approach[1] ELBERT E. M. CHIA, Nanyang Tech Univ, CHAN LA-O-VORAKIAT, King Mongkuts University of Technology Thonburi, JEANNETTE KADRO, TEDDY SALIM, DAMING ZHAO, Nanyang Tech Univ, TOWFIQ AHMED, Los Alamos National Laboratory, YENG MING LAM, Nanyang Tech Univ, JIAN-XIN ZHU, Los Alamos National Laboratory, RUDOLPH MARCUS[2], California Institute of Technology, MARIA-ELISABETH MICHEL-BEYERLE, Nanyang Tech Univ — Using terahertz time-domain spectroscopy (THz-TDS), we study the temperature-dependent phonon modes of the organometallic lead iodide perovskite $CH_3NH_3PbI_3$ thin film across the terahertz (0.5-3 THz) and temperature (20-300 K) ranges. These modes are related to the vibration of the Pb-I bonds. We found that two phonon modes in the tetragonal phase at room temperature split into four modes in the low-temperature orthorhombic phase. By use of the Lorentz model fitting, we analyze the critical behavior of this phase transition.

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