

Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

Phonon

Mode Transformation across the Orthorhombic-Tetragonal Phase Transition in a Lead-Iodide Perovskite $\text{CH}_3\text{NH}_3\text{PbI}_3$: a Terahertz Time-Domain Spectroscopy Approach¹

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 MARCUS², 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 $\text{CH}_3\text{NH}_3\text{PbI}_3$ 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.

¹King Mongkuts University of Technology Thonburi (Grant No. SCI58-003), Singapore MOE Tier 1 (RG13/12, RG123/14), ONR, ARO, NTU Biophysics Center, LANL LDRD, LANL CINT.

²Nanyang Tech Univ

Ee Min Chia
Nanyang Tech Univ

Date submitted: 04 Nov 2015

Electronic form version 1.4