Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Electron phonon couplings in 2D perovskite probed by ultrafast photoinduced absorption spectroscopy. UYEN HUYNH, LIMENG NI, AKSHAY RAO, Univ of Cambridge — We use the time-resolved photoinduced absorption (PIA) spectroscopy with 20fs time resolution to investigate the electron phonon coupling in the self-assembled hybrid organic layered perovskite, the hexyl ammonium lead iodide compound $(C_6H_{13}NH_3)_2$ (PbI_4). The coupling results in the broadening and asymmetry of its temperature-dependence photoluminescence spectra. The exact time scale of this coupling, however, wasn't reported experimentally. Here we show that using an ultrashort excitation pulse allows us to resolve from PIA kinetics the oscillation of coherent longitudinal optical phonons that relaxes and self-traps electrons to lower energy states within 200 fs. The 200fs relaxation time is equivalent to a coupling strength of 40meV. Two coupled phonon modes are also identified as about 100 cm^{-1} and 300 cm^{-1} from the FFT spectrum of the PIA kinetics. The lower energy mode is consistent with previous reports and Raman spectrum but the higher energy one hasn't been observed before.

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Date submitted: 10 Nov 2016 Electronic form version 1.4