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Dynamics of acoustic phonons in exciton self-trapping in a quasi-one-dimensional system F.X. MORRISSEY, S.L. DEXHEIMER, Washington State University — The localization of electronic excitations via electron-lattice interactions is an important fundamental process in molecular-based electronic materials. In our previous work, we directly time-resolved the electronic and vibrational dynamics of the exciton self-trapping process in the quasi-one-dimensional mixed-valence metal-halide linear chain (MX) complexes $[Pt(en)_2][Pt(en)_2X_2]$, (X = Cl, Br, I) using femtosecond coherent phonon techniques. In this work, we present transient absorption measurements on PtBr(en) at low temperature that reveal a large amplitude, strongly damped oscillatory component at a frequency of 11 cm^{-1} that is consistent with the generation of a coherent acoustic wave associated with the formation of the localized lattice deformation that stabilizes the self-trapped state. Comparison with models for polaron formation provides an estimate of the spatial extent of the local deformation of $\sim$ 5 unit cells. This work is supported by the NSF under grant DMR-0305403.

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