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THz time domain spectroscopy of low-frequency vibrations in a quasi-one-dimensional system A. BANDYOPADHYAY, S.L. DEXHEIMER, Washington State University — The mixed-valence halide-bridged transition metal linear chain (MX) complexes are prototypical quasi-one-dimensional systems, with a charge density wave ground state and localized electronic excitations analogous to those of conjugated organic polymers. In this work, we present studies of the low-frequency infrared-active vibrational modes of the MX complex $[\text{Pt}(\text{en})_2][\text{Pt}(\text{en})_2\text{I}_2](\text{PF}_6)_4$ (en = ethylenediamine, $\text{C}_2\text{H}_8\text{N}_2$) in the frequency range 0.3 - 3 THz using terahertz time-domain spectroscopic techniques. Distinct polarization-dependent complex refractive indices are observed in single-crystal samples of this highly anisotropic material. The measurements reveal a strong absorption at a frequency of 2.24 THz (75 cm^{-1}) polarized along the chain axis, which we assign to the infrared-active ν_3 vibrational mode, involving relative motion of the mixed-valence ions in the charge density wave structure. This work is supported by NSF grant DMR-0706407.

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