

Abstract Submitted
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Comparative Study of Phonon Modes and Carrier Mobility in $\text{CH}_3\text{NH}_3\text{PbX}_3$ ($\text{X} = \text{Cl}, \text{Br}, \text{I}$) Perovskites using Terahertz Time-Domain Spectroscopy DAMING ZHAO, HONGWEI HU, TEDDY SALIM, LIANG CHENG, Nanyang Tech Univ, CHAN LA-O-VORAKIAT, King Mongkuts University of Technology Thonburi, YENG MING LAM, RUDOLPH MARCUS, MARIA-ELISABETH MICHEL-BEYERLE, ELBERT CHIA, Nanyang Tech Univ — Since organometallic halide perovskites are not only light absorbers but also hole-transporting materials in photovoltaic applications, high carrier mobility is therefore desired. In polar semiconductors (e.g. $\text{CH}_3\text{NH}_3\text{PbX}_3$), the charge carrier mobility is limited by electron-optical phonon scattering, whose upper limit depends sensitively on the lowest-frequency phonon modes. Using THz time-domain spectroscopy, we examine the temperature evolution of these phonon modes, and then calculate their carrier mobilities. This method allows us to estimate the carrier mobilities without the need to create photogenerated free carriers, and can be applied to other dipole semiconductor systems.

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