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标题: Waveguide terahertz time-domain spectroscopy of ammonium nitrate polycrystalline films
作者: Khachatryan, A (Khachatryan, Ani); Melinger, JS (Melinger, Joseph S.); Qadri, SB (Qadri, Syed B.)

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摘要: We report temperature-dependent measurements of the terahertz (THz) vibrational spectrum of ammonium nitrate (AN) films and mixed potassium nitrate (KN)-ammonium nitrate films using waveguide THz time domain spectroscopy. The experiments were performed on polycrystalline films on the metal surface of a parallel plate waveguide. At cryogenic temperature and with frequency resolution as high as 7 GHz, our measurements produce a complex vibrational spectrum for AN, and show vibrational resonances not observed in previous far infrared and Raman measurements. We investigate potential interactions between AN and the metal surface by measuring THz spectra of films on aluminum, gold, and a gold surface coated with an organic self-assembled monolayer. Measurements are also performed on a deuterated AN film and indicate that the observed THz modes are due largely to the motion of the nitrate ions in the AN crystal. Finally, the effect of introducing small amounts of an impurity into the AN lattice is examined. We find that introduction of as little as 1%-2% by weight of potassium nitrate into the AN lattice causes line broadening of the THz modes, which is consistent with increased disorder introduced by the impurity. [<http://dx.doi.org/10.1063/1.4709385>]

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地址: [Khachatryan, Ani; Melinger, Joseph S.] USN, Elect Sci & Technol Div, Code 6812, Res Lab, Washington, DC 20375 USA

[Qadri, Syed B.] USN, Mat Sci & Technol Div, Code 6366, Res Lab, Washington, DC 20375 USA

通讯作者地址: Melinger, JS (通讯作者), USN, Elect Sci & Technol Div, Code 6812, Res Lab, Washington, DC 20375 USA

电子邮件地址: joseph.melinger@nrl.navy.mil

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