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Title

Tuning of superconducting niobium nitride terahertz metamaterials

Source

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Abstract

Superconducting planar terahertz (THz) metamaterials (MMs), with unit cells of different sizes, are fabricated on 200 nm-thick niobium nitride (NbN) films deposited on MgO substrates. They are characterized using THz time domain spectroscopy over a temperature range from 8.1 K to 300 K, crossing the critical temperature of NbN films. As the gap frequency ($f_g = 2\Delta_0/h$, where Δ_0 is the energy gap at 0 K and h is the Plank constant) of NbN is 1.18 THz, the experimentally observed THz spectra span a frequency range from below f_g to above it. We have found that, as the resonance frequency approaches f_g, the relative tuning range of MMs is quite wide (30%). We attribute this observation to the large change of kinetic inductance of superconducting film.(28 References).