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Title:Terahertz superconducting plasmonic crystals
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Abstract:We present a thermal active control over terahertz (THz) extraordinary transmission induced by a plasmon in a periodic subwavelength holes array and a patch array. Both arrays consist of high transition temperature YBCO superconductors using THz time domain spectroscopy (THz-TDS). In the periodic subwavelength YBCO holes array, we observe a transition between a virtual excitation type surface plasmon polaritons (SPP) mode and a real SPP mode accompanied with transmission amplitude modulation. This can be attributed to the c-axis Josephson plasma frequency. On the other hand, since dipole localized surface plasmon can be excited by direct optical illuminations without phase-matching techniques, we observe a transmission amplitude modulation induced by combining the normal state carriers and the superconducting carriers in the periodic subwavelength YBCO patch array. These THz superconducting plasmonic crystals hold great potential in application for extreme low-loss, large dynamic amplitude modulation, surface plasmon-based function devices.
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