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Title:An ultrabroad terahertz bandpass filter based on multiple-resonance excitation of a composite metamaterial

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Abstract:We experimentally present an ultrabroad terahertz (THz) bandpass filter based on a composite metamaterial (CMM) by exciting its multiple resonances. This metamaterial-based filter, consisting of a metal-dielectric-metal sandwiched structure, possesses a notable spectral-filtering capability with a 0.5-THz-broad bandwidth and excellent band-edge transitions of 140% THz and 182% THz in the THz-gap region. Furthermore, we manifest the mechanism for each of the resonances and the coupling within the composite metamaterial. This realization enables the capacity for engineering the electromagnetic properties to develop other complex optical functionalities. An example of a high-profile dualband THz bandpass filter is also proposed theoretically in this work.

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