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Title:A broadband planar terahertz metamaterial with nested structure
Authors:Chowdhury, Dibakar Roy (1); Singh, Ranjan (1); Reiten, Matthew (1); Chen, Hou-Tong (1); Taylor, Antoinette J. (1); O'Hara, John F. (1); Azad, Abul K. (1)
Author affiliation:(1) MPA-CINT, Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545, United States
Corresponding author:Chowdhury, D.R.(dibakar@lanl.gov)
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Abstract:We demonstrate the broadening of fundamental resonance in terahertz metamaterial by successive insertion of metal rings in the original unit cell of a split ring resonator (SRR) forming an inter connected nested structure. With the subsequent addition of each inner ring, the fundamental resonance mode shows gradual broadening and blue shift. For a total of four rings in the structure the resonance linewidth is enhanced by a factor of four and the blue shift is as large as 316 GHz. The dramatic increase in fundamental resonance broadening and its blue shifting is attributed to the decrease in the effective inductance of the entire SRR structure with addition of each smaller ring. We also observe that while the fundamental resonance is well preserved, the dipolar mode resonance undergoes multiple splittings with the addition of each ring in the nest. Such planar metamaterials, possessing broadband resonant response in the fundamental mode of operation, could have potential applications for extending the properties of metamaterials over a broader frequency range of operations.
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