

Coherent Metamaterials

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Abstract

We introduce "coherent" metamaterials as a platform for passive and gain-assisted photonic devices

Summary

We demonstrate a new class of "coherent" metamaterials, where narrow band responses are formed by collective and coherent excitations of strongly interacting meta-molecules while the transmission and reflection spectra depend on the size of the array.

Coherent meta-materials provide a promising platform for various applications including slow-light and polarization controlling devices and the "lasing spaser" which we illustrate in a number of microwave, THz and optical experiments.

For the first time we show experimentally that resonant properties and losses in photonic metamaterial may be controlled by gain.