

Photonic planar metamaterials: spectral selectivity, magnetic mirror, optical activity and asymmetric transmission

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Abstract: We will give a review of our recent progress in the field of planar metamaterials, which represent a new paradigm for future photonic applications. Photonic planar metamaterials are based on ultimately thin metal films, which can strongly interact with light due to artificial patterning on a nanometer scale. We will show that such low-dimensional structures (effectively media of “zero” dimension in the direction of light propagation) can demonstrate and improve functionality of the exciting bulk optical components such as spectral filters, polarizers and optical rotators. But more importantly nanostructured metal films exhibit rather exotic and intriguing electromagnetic properties not available in nature such as magnetic mirror and asymmetric transmission.