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Selective reflection by deteriorated phase accumulation in Fabry-Perot cavity with aperiodic metallic nanomesh entry windows TIANYI SUN, CHUANFEI GUO, University of Houston, KRZYSZTOF KEMPA, Boston College, ZHIFENG REN, University of Houston — A Fabry-Perot reflection filter, consisting of semi-transparent metal and dielectric layers on opaque metals, is featured by selective absorption determined by the phase difference of waves from the two interfaces. In such systems, semi-transparency is usually realized by layers of reflective metals thinner than the penetration depth of the light. Here we present a filter cavity with entry windows not made of traditional thin layers, but of aperiodic metallic random nanomeshes thicker than the penetration depth, fabricated by grain boundary lithography. It is shown that due to the deteriorated phase caused by the interface between the random nanomesh and the dielectric layer, the width and location of the resonances can be tuned by metallic coverage. Further experiments show that this phenomenon can be used in designing aperiodic plasmonic metamaterial structures for visible and infrared applications.

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