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Versatility of Antireflection using Low-loss Metasurface . KHAGENDRA BHATTARAI, University of South Florida, ZAHYUN KU, Air Force Laboratory, JIANGFENG ZHOU, University of South Florida — Conventional thin-film antireflection (AR) coating has problems due to the unavailability of the specific film material at the specific wavelength and also fabrication difficulty specifically at THz regime where very thick film is required. We develop a versatile technique to get low loss antireflection by depositing a metallic resonator on the top of conventional dielectric coating. The flexibility of changing the resonance of the resonator by changing its size, make it flexible to use at any desired wavelength with significantly decreased thickness. Since the resonance of the resonator is far from the anti-reflection resonance, possible loss originated from its resonance is nearly zero at the anti-reflection region. With an improved retrieval method, the metasurface is proved to exhibit a high effective permittivity ($\epsilon_{eff} \approx 20$) and extremely low loss ($\tan\delta \approx 0.005$). A classical thin-film AR coating mechanism is identified through analytical derivations and numerical simulations.

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