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A Metasurface Anti-reflection Coating for Enhancing Surface Plasmon-Polariton of Metallic Hole Array. KHAGENDRA BHATTARAI, Department of Physics, University of South Florida, Tampa, FL 33620, USA, JIYEON JEON, JUN KIM, Korea Research Institute of Standards and Science, Daejeon, 305-340, Korea, ZAHYUN KU, Air Force Research Laboratory, Dayton, OH 45433, USA, SANG JUN LEE, Korea Research Institute of Standards and Science, Daejeon, 305-340, Korea, JIANGFENG ZHOU, Department of Physics, University of South Florida, Tampa, FL 33620, USA, USF, USA COLLABORATION, KRISS, KOREA COLLABORATION, AFRL, USA COLLABORATION — We demonstrate a metasurface made of metallic disk resonator array as an anti-reflection (AR) coating to enhance (reduce) the transmission (reflection) through metal hole array (MHA). Our result show that the simulated (measured) transmission at the first order surface plasmon-polariton (SPP) resonance is increased up to 82 %(88%) compared to uncoated MHA. The electric field of the surface wave is also enhanced by 33%. Using an effective medium theory, we show that the metasurface operates at off-resonance wavelengths and can be understood as a thin film that exhibits high effective permittivity (˜30) with very low loss (loss tangent ˜0.005). Thus we reveal the mechanism of the metasurface AR coating as the traditional thin film AR coating. With tunable effective permittivity, our structure provides great flexibility to achieve AR coating for general substance at any wavelength.

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