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Making structured metals transparency for broadband and wide-incidence-angle electromagnetic waves RENHAO FAN, RUWEN PENG, Nanjing University, XIANRONG HUANG, Argonne National Laboratory, MU WANG, Nanjing University — Very recently, we have demonstrated that one-dimensional metallic gratings can become transparent and completely antireflective for extremely broadband electromagnetic (EM) waves under oblique incidence. However, the oblique-incidence geometry, is inconvenient for the technological applications. To overcome this drawback, here we instead use oblique metal gratings with optimal tilt angles to achieve normal-incidence broadband transparence for EM waves. Further we use two-dimensional periodic metallic cuboids to achieve broadband and broad-angle high transmission and antireflection. By introducing such metallic cuboids arrays into silicon solar cells, we find that high performance of light trapping in the cells can be obtained with a significant enhancement of the ultimate quantum efficiency. The structured metals, which achieve broadband and broad-angle high transmission for EM waves, may have many other potential applications, such as transparent conducting panels, white-beam polarizers, and stealth objects. References: R. H. Fan, R. W. Peng, X. R. Huang et al., Adv. Mater. 24, 1980 (2012); R. H. Fan, J. Li, R. W. Peng et al., Appl. Phys. Lett. 102, 171904 (2013); and R. H. Fan, L. H. Zhu, R. W. Peng et al., Physical Review B, 87, 195444 (2013).

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