Abstract Submitted
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Propagating and Localized Surface Waves in Metamaterial Stacks[1] RUWEN PENG, YONGJUN BAO, ZHAOHUI TANG, FENG GAO, ZHIJIAN ZHANG, WEIHUA SUN, XIN WU, MU WANG, National Laboratory of Solid State Microstructures , NATIONAL LABORATORY OF SOLID STATE MICROSTRUCTURES TEAM — We demonstrate the interference effect between propagating and localized surface modes of electromagnetic wave in metamaterial stacks, which leads to a transmission extremum. When radiation is incident on a metal surface perforated with an array of ring-shaped subwavelength apertures, the phase difference between the propagating surface Bloch wave and the localized surface wave can be tailored by the geometrical parameters of the array so as to affect the shape of the transmission spectrum. Above the resonant frequency of the aperture, interference between the surface waves leads to a minimum in the transmission spectrum, whereas below it, the interference leads to a maximum. While in multiple metamaterial stacks with hole arrays, the coupling of surface electromagnetic wave yields a new resonant mode with increasing quality factor of the transmission peak. We suggest that these features provide flexibility in engineering surface wave-based all-optical devices. Reference: Y. J. Bao, R. W. Peng, D. J. Shu, Mu Wang, X. Lu, J. Shao, W. Lu,and N. B. Ming, Phys. Rev. Lett. (2008) 101, 087401.

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