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Band modulation and in-plane propagation of surface plasmons in composite nanostructures REN-HAO FAN, DI-HU XU, KUN ZHANG, RU-WEN PENG, MU WANG, Nanjing University — In this work, we have experimentally and theoretically studied band modulation and in-plane propagation of surface plasmons (SPs) in composite nanostructures with aperture arrays and metallic gratings. It is shown that the plasmonic band structure of the composite system can be significantly modulated because of coupling between the aperture and the grating. By changing the relative positions between these optical components, the resonant modes would shift or split. And the resonant SP modes launched on the structure surface can be effectively modified by the geometric parameters. Further, we provide an experimental observation to directly show the SP in-plane propagation by using far-field measurements. Our study offers a convenient way for observing the SP propagation in far field, and provides unique composite nanostructures for possible applications in subwavelength optodevices, such as optical sensors and detectors.

References: D. H. Xu, K. Zhang, M. R. Shao, H. W. Wu, R. H. Fan, R.W. Peng, and Mu Wang, *Optics Express*, 22, 25700 (2014); R. H. Fan, L. H. Zhu, R. W. Peng, X. R. Huang, D. X. Qi, X. P. Ren, Q. Hu, and Mu Wang, *Physical Review B*, 87, 195444 (2013).

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