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Novel meta-surfaces for wave manipulation SHULIN SUN, National Taiwan University, QIONG HE, SHIYI XIAO, Fudan University, QIN XU, LEI ZHOU, Fudan University — Meta-materials are man-made electromagnetic (EM) materials composed by subwavelength local resonance structures of electric and/or magnetic type, and thus possess arbitrary values of permittivity and permeability dictated by such resonance structures. Many novel EM properties, such as the negative refraction, the superlensing effect, and even the invisibility cloaking were predicted or discovered based on meta-materials. By carefully designing metamaterials with appropriate EM wave properties, one can employ metamaterials to efficiently manipulate various properties of EM waves, including the wave propagation, polarization, and so on. Here, we present our latest theoretical and experimental efforts in designing novel meta-surfaces (ultra-thin metamaterials) with anomalous EM wave properties to allow efficiently manipulating wave propagation directions. Furthermore, our system can also convert propagating wave to surface plasmon polariton. Microwave experiments are performed on realistic structures to successfully realize the theoretical predictions, and the obtained results are in agreements with FDTD simulations.

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