

Recent Progresses on Meta-surfaces: From Active Phase Modulation to High-efficiency Photonic Spin-hall Effect

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Zhou Lei

Fudan University

The arbitrary control of electromagnetic (EM) waves is a key aim of photonic research. Conventional optical materials have limited abilities to manipulate EM waves due to their limited variation ranges of material parameters. Meta-surfaces are ultra-thin inhomogeneous meta-materials composed by artificial deep-subwavelength planar meta-atoms arranged in specific macroscopic orders, and were found to exhibit extraordinary capabilities to control EM waves leading to many fascinating phenomena such as anomalous refraction/reflection, planar-lens focusing and optical vortex generalizations. In this talk, the speaker will briefly review the recent efforts in employing meta-surfaces to control EM waves in various aspects. In particular, the speaker will describe how to realize full-range active phase modulations using graphene-based meta-surfaces and high-efficiency photonic spin-hall effects with carefully designed meta-surfaces.