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Control Surface Plasmon-Polaritons with Nanolayers and Nanostructures

JUNPENG GUO, University of Alabama in Huntsville

Surface plasmon nanophotonics is an emerging area which has manifested many potential applications for sensing, imaging, and communications. Surface plasmons are the free electron density oscillations on surfaces of metals. The free conduction electron density oscillations are always coupled with localized electromagnetic fields. An important property of surface plasmon-polaritons is the highly confined electromagnetic field near metal surfaces at the plasmon resonance. Although surface plasmons can confine electromagnetic energy in the nano-scale, a fundamental problem is the energy dissipation/loss in metal materials. In this talk, I will review recent progress in mitigating the loss of surface plasmon-polaritons and techniques for engineering surface plasmon-polaritons with hetero-dielectric nanolayers and nanostructures for various applications.