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Hybrid graphene/dielectric metasurfaces for enhanced transmission modulation CHRISTOS ARGYROPOULOS, University of Nebraska-Lincoln — All-dielectric silicon based metasurfaces are powerful platforms to enhance light-matter interactions at nanoscale regions. Their low-loss nature, CMOS processing compatibility and increased damage threshold promise to outperform the functionalities of the recently established plasmonic metallic metasurfaces. In our talk, we will demonstrate ways to hybridize all-dielectric metasurfaces with graphene in order to obtain new electro-optical devices. In particular, a hybrid graphene/dielectric metasurface design will be presented to achieve tunable and modulated transmission at near-infrared (near-IR) frequencies (C. Argyropoulos, Optics Express, vol. 23, No. 18, pp. 23787-23797, 2015). The proposed all-dielectric metasurface is composed of periodically arranged pairs of asymmetric silicon nanobars, which can sustain trapped magnetic resonances with a sharp Fano-type transmission signature. One-atom-thick graphene is placed over this dielectric metasurface and strong transmission modulation is obtained at near-IR telecom wavelengths as the doping level of graphene is increased. The enhanced in-plane fields along the all-dielectric metasurface strongly interact with the tunable properties of graphene. This leads to strong coupling between the incoming radiation and graphene. Several new integrated nanophotonic components are envisioned based on the proposed device, such as efficient electro-optical transmission modulators.

Christos Argyropoulos
University of Nebraska-Lincoln

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