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School of Electrical

May 26, 2016

Seminar, May 26, 2016, 12:00. ICFOa??s Seminar Room

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VLADIMIR M. SHALAEV 'New Material Platforms & Metasurface Designs for Plasmonics and Quantum Photonics'

The use of plasmonic effects over a broad range of electromagnetic spectrum has been a challenge over the few decades of research due to limited number of available materials and practical designs. Recently, the efforts in the area have been concentrated on identifying and examining new, practical design concepts such as planar metasurfaces as well as novel material classes as the building blocks for future photonic technologies. In this seminar we will discuss the recent progress in developing new plasmonic materials and metasurface devices that will form the basis for future low-loss, CMOS-compatible devices and their applications in nano-optics, plasmonics, and quantum photonics. In particular, we will discuss the advances in the fields of refractory plasmonic devices, metasurface designs, and room-temperature quantum photonics with color centers in diamond.

ALEXANDRA BOLTASSEVA 'Transition Metal Nitrides and Transparent Conducting Oxides for On-Chip Nanophotonic Devices'

Plasmonics has long been seen as a promising technology for integrated optical devices for many fundamental applications such as telecommunications, chemistry, quantum science, and medicine. Recently, CMOS compatible materials titanium nitride and transparent conducting oxides (such as doped zinc oxide) have been proposed for telecommunication

applications. TiN is a gold-like ceramic material with a permittivity cross-over near 500 nm. Partnering TiN with CMOS-compatible silicon nitride enables a fully solid state waveguide which is able to achieve a propagation length greater than 1 cm for a ~8 I¼m mode size at 1.5 I¼m. Utilizing highly doped zinc oxide films as a dynamic photonic material, hi h performance modulators can also be realized. Together, these alternative materials form t e base of a fully integrated nanophotonic system, capable of exceptional performance wi h speeds greater than 1 THz. Due to the ability of TCO nanostructures to support stro g plasmonic resonance in the near infrared (NIR), metasurface devices, such as a quarter wa e plate, have been demonstrated whose properties can be easily adjustable with po t processing such as thermal annealing. Additionally, TCOs can be used as epsilon near ze o (ENZ) materials in the NIR. TCOs are shown to be extremely flexible materials, enabli g fascinating physics and unique devices for applications in the NIR regime.

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Hosted by Prof. Javier Garcia de Abajo and Prof. Frank Koppens