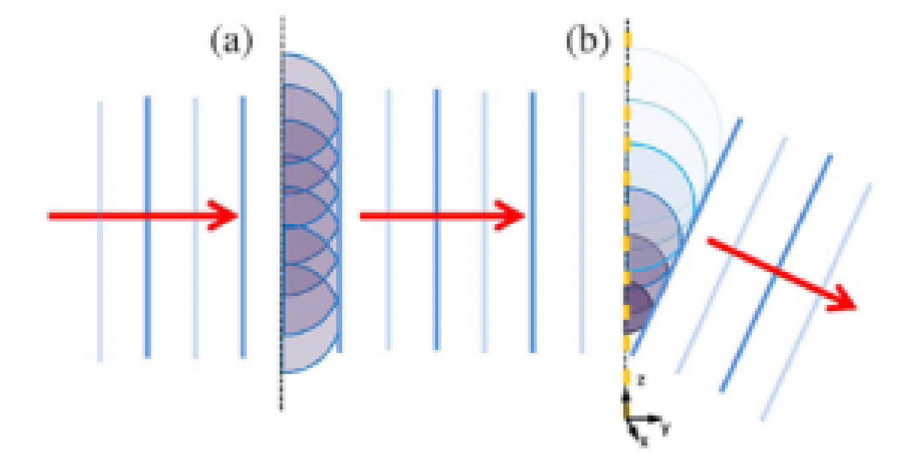
[Recent advances in planar optics: from plasmonic to dielectric metasurfaces]

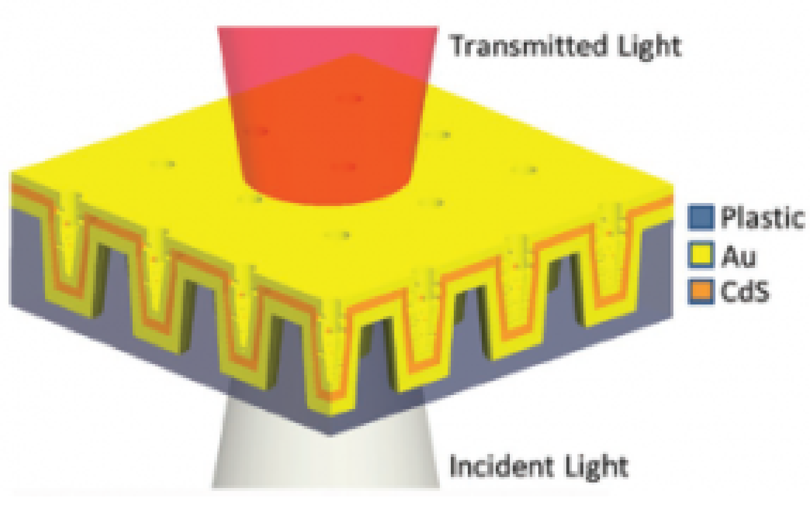


This article reviews recent progress leading to the realization of planar optical components made of a single layer of phase shifting nanostructures. After introducing the principles of planar optics and discussing earlier works on subwavelength diffractive optics,they introduce a classification of metasurfaces based on their different phase mechanisms and profiles and a comparison between plasmonic and dielectric metasurfaces. They place particular emphasis on the recent developments on electric and magnetic field control of light with dielectric nanostructures and highlight the physical mechanisms and designs required for efficient all-dielectric metasurfaces. Practical devices of general interest such as metalenses, beam deflectors, holograms, and polarizing interfaces are discussed, including high-performance metalenses at visible wavelengths. Successful strategies to achieve achromatic response at selected wavelengths and near unity transmission/reflection efficiency are discussed. Dielectric metasurfaces and dispersion management at interfaces open up technology opportunities for applications including wavefront control, lightweight imaging systems, displays, electronic consumer products, and conformable and wearable optics.

Source: https://www.osapublishing.org/optica/abstract.cfm?uri=optica-4-1-139

Related paper: Patrice Genevet et al.,Recent advances in planar optics: from plasmonic to dielectric metasurfaces, Optica ,Vol. 4, Issue 1, pp. 139-152, (2017).

Plasmonic Sensing of Oncoproteins without Resonance Shift Using 3D Periodic Nanocavity in Nanocup Arrays



A sensor design and sensing method based on plasmonic–photonic interactions that occur when a nanocavity array is embedded in a 3D tapered nanocup plasmonic substrate are reported. This device enables highly sensitive detection of refractive index changes based on changes to the transmission peak intensity without shift in the resonance wavelength. Unlike conventional plasmonic sensors, there is a consistent and selective change in the transmission intensity at the resonance peak wavelength with no spectral shift. In addition, there are wavelength ranges that show no intensity change, which can be used as reference regions. The fabrication and characterization of the plasmonic nanocavity sensor are described and also advanced biosensing is demonstrated. Simulations are carried out to better understand the plasmon–photonic coupling mechanism. This nanocavity plasmonic sensor design has a limit of detection of 1 ng mL^{-1} (5×10^{-12}m) for the cancer biomarker carcinoembryonic antigen (CEA), which is a significant improvement over current surface plasmon resonance systems, and a dynamic range that is clinically relevant for human CEA levels.

Source: **http://onlinelibrary.wiley.com/doi/10.1002/adom.201601051/full**

Related paper: Abid Ameen et al.,Plasmonic Sensing of Oncoproteins without Resonance Shift Using 3D Periodic Nanocavity in Nanocup Arrays, Adv. Optical Mater. ,Volume 5, Issue 11, 1601051, (2017).