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Plasmonic Biosensors based on Multi-Layered Metallodielectric Nanostructures ALP ARTAR, AHMET YANIK, HATICE ALTUG, Department of Electrical and Computer Engineering, Boston University — Nanoplasmonics found many applications in diverse topics of optics such as biosensing, solar cells, etc. Studies built up so far is focused on 2D nanostructures, however expanding into the third dimension will provide higher degrees of freedom in the design space. Third dimension is mostly avoided because of fabrication related issues and therefore novel approaches are required. In this work, we have investigated the hybrid multi-layered metallic structures. Transmission spectra provided the conventional extraordinary optical transmission peaks and in addition the newly found modes, which are observed due to the coupling of nanohole and nanoparticle layers. In this talk, we will present the effects of these plasmonic and photonic interactions between nanostructure layers. The newly found mode is explained as the fundamental Fabry-Perot mode of the nanocavity. Numerical analysis shows that the field pattern overlap in the dielectric is superior to any other mode, therefore making this resonance highly sensitive to refractive index changes. Also we will present new results from another coupled 3D structure, multi-layered nanohole arrays.

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