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A metamaterial cavity for refractive index sensing KHAGENDRA BHATTARAI, University of South Florida, ZAHYUN KU, The Air Force Research Laboratory, JIANGFENG ZHOU, University of South Florida, UNIVERSITY OF SOUTH FLORIDA TEAM, THE AIR FORCE RESEARCH LABORATORY COLLABORATION — In this work, we demonstrated a metamaterial cavity consists of plasmonic metasurfaces made of gold nano-disks. We have shown that the Fabry-Perot cavity resonant modes arise around the plasmonic resonance wavelength. Compared to the localized plasmonic resonances, the quality factor of the cavity resonance is significantly increased. The cavity resonances are very sensitive to the refractive index of the surrounding materials. More importantly, the higher order cavity modes can further reduce the losses and improve the sensitivity. Numerical simulations show that the reflection shifts by 80% when the refractive index of the surrounding liquid material changes from 1.312 to 1.352.

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