Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

High sensitivity plasmonic sensor based on sharp cavities MICHAEL J. NAUGHTON, JUAN M. MERLO, CHAOBIN YANG, YITZI M. CALM, MICHAEL J. BURNS, Boston College — Surface plasmon resonance sensors have been demonstrated as among the most useful applications of the surface plasmon phenomena. SPR sensors are sensitive enough to detect low refractive index shifts, a critical factor in many biological applications [1]. We present a SPR sensor based on sharp cavities. An antipillar template is fabricated in PDMS and the resulting cavities are coated with a thin film of Ag. Optimization of the Ag film thickness allows one to tune and enhance the optical transmittance and response sensitivity. We also report that the proposed sensor demonstrates sensitivity at one, and likely several, orders of magnitude higher than the maximum sensitivity reported in the literature for different, similar, devices [2]. Numerical calculations show that the sensitivity is due to the strong confinement of localized plasmons inside the cavities, particularly at the sharpest ends. [1] S. Zeng, D. Baillargeat, H. P. Hod, K. T. Yong, Chem. Soc. Rev. 43, 3426 (2014). [2] M. R. Gartia, A. Hsiao, A. Pokhriyal, S. Seo, G. Kulsharova, B. T. Cunningham, T. C. Bond, G. L. Liu. Adv. Opt. Mat., 1, 68 (2013).

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Date submitted: 05 Nov 2015 Electronic form version 1.4