

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Surface plasmons excitation and manipulation by low-energy electrons MICHAEL J. BURNS, JUAN M. MERLO, YITZI M. CALM, MICHAEL J. NAUGHTON¹, Boston College — Surface plasmons coupled by optical fields have been widely used to control the propagation of electromagnetic fields in the nanoscale range. We propose numerically the use of low-energy electrons to excite and manipulate surface plasmons in metallic surfaces by using different configurations of tunneling junctions. Modeling the inelastic electron scattering at tunneling junctions as an electric dipole, it is possible to use an electromagnetic model to reproduce experimental results already reported [1]. Following this methodology, we demonstrate that it is possible to mimic novel plasmonic elements that can be excited only by optical fields, i.e. focused beams. Our results open a wide range of applications because it avoids the noise produced by direct light excitation in the detection of surface plasmons. Finally, as an application of our proposed scheme, we study the unidirectional surface plasmon coupler, getting similar results to those recently reported [2].

[1] J.K. Gimzewski, J. K. Sass, R. R. Schlitte and J. Schott, *Europhys. Lett*, **8**, 435 (1989).

[2] F. Ye, M. J. Burns and M. J. Naughton, *Adv. Optical Mat.* **2**, 957, (2014).

¹Supported by the W.M. Keck Foundation.

Michael Naughton
Boston College

Date submitted: 13 Nov 2014

Electronic form version 1.4