Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Adiabatic Nanoplasmonic Energy Concentration[1] MARK STOCKMAN, Department of Physics and Astronomy, Georgia State University, Atlanta, GA 30303 — We predict that propagation of surface plasmon polaritons (SPPs) toward a sharp edge of smoothly (adiabatically) graded metallic layer causes their slowing down and asymptotic stopping. This is accompanied by a concentration of electromagnetic energy and enhancement of local optical fields. As such a nano-concentration effect , we consider the adiabatic energy concentration in a conic nanoplasmonic waveguide ..[1]. In this case, SPPs are created in the $m = 0$ plasmonic state at the wide (microscopic) edge of the system and propagate toward the tip of the conic waveguide. As local radius $R$of the cone waveguide decreases, both the phase and group velocity tend to zero $\propto R$. This asymptotic stopping lead to the accumulation of SPPs at the tip and their adiabatic transformation to the standing surface plasmons. For silver, it is possible to have local optical intensity at the tip increased by three orders of magnitude. We also discuss two- dimensional focusing nanoplasmonic waveguides. In conclusion, we will discuss the many prospective application of this effect. [1]. M. I. Stockman, *Nanofocusing of Optical Energy in Tapered Plasmonic Waveguides*, Phys. Rev. Lett. **93**, 137404-1-4 (2004).

[1]This work was supported by grants from the Chemical Sciences, Biosciences and Geosciences Division of the Office of Basic Energy Sciences, Office of Science, U.S. Department of Energy

Mark Stockman
Department of Physics and Astronomy,
Georgia State University, Atlanta, GA 30303

Date submitted: 13 Dec 2004 Electronic form version 1.4