

Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Focused Surface Plasmons for Enhanced Raman Scattering¹

ALEXANDRA IMRE, Materials Science Division and Center for Nanoscale Materials, Argonne National Laboratory, JOHN T. BAHNS, LIAOHAI CHEN, Biology Division, Argonne National Laboratory, JOHN E. PEARSON, JON M. HILLER, VITALII K. VLASKO-VLASOV, ULRICH WELP, Materials Science Division, Argonne National Laboratory — Surface plasmon polaritons launched at concentric arcs can be focused into a sub-wavelength wide focal spot of high near-field light intensity. When increasing the number of arcs from one to eight the focused intensity increases by a factor of 30. The focused plasmons give rise to enhanced Raman scattering from R6G molecules placed in the focal area. By exploiting the polarization dependence of the focusing we establish an enhancement of the Raman signal by a factor of three. Our results show that focusing of propagating surface plasmons on flat metal surfaces may be an alternative to localized plasmons on metal nanostructures for achieving enhanced Raman scattering. In particular, a flat metal substrate enables better control over the local electric fields and the placement of analyte molecules, and, therefore, ultimately better fidelity of Raman spectra.

¹This work was supported by DOE, BES-Materials Sciences, under Contract DE-AC02-06CH11357 and the National Institute of Health under Grant 5 R01 NS047719 (JTB, LHC).

Alexandra Imre
Argonne National Laboratory

Date submitted: 30 Nov 2006

Electronic form version 1.4