

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Plasmonic nanotips for spectroscopy with nanometer-scale resolution JOHANNES FEIST, ITAMP, Harvard-Smithsonian Center for Astrophysics, SEMION K. SAIKIN, Department of Chemistry and Chemical Biology, Harvard University, M.T. HOMER REID, Research Laboratory of Electronics, Massachusetts Institute of Technology, ALÁN ASPURU-GUZIĆ, Department of Chemistry and Chemical Biology, Harvard University, MIKHAIL D. LUKIN, Department of Physics, Harvard University — We theoretically investigate the use of metallic nanotips, i.e. nanowires with a sharp tip, as tools for spectroscopic applications such as surface-enhanced Raman scattering (SERS). Nanotips can provide strong coupling between guided plasmon modes and single emitters such as atoms or molecules. At the same time, the spatial localization of the plasmon response can potentially provide nanometer-scale spatial resolution in a scanning-tip setup. In particular, we will focus on the possibilities of transporting the electromagnetic field to the target through the surface plasmon mode on the wire, and on coupling the emitted radiation into the same mode. We compare the performance of such an approach with more conventional SERS setups, where localized surface plasmons are used to enhance the local field of an incoming laser beam and the emitted free-space radiation. Finally, we will discuss whether single-molecule sensitivity can be reached.

Johannes Feist
ITAMP, Harvard-Smithsonian Center for Astrophysics

Date submitted: 08 Dec 2011

Electronic form version 1.4