

Abstract Submitted
for the TSF10 Meeting of
The American Physical Society

Low-concentration chemical sensing using surface-enhanced coherent anti-Stokes Raman spectroscopy¹ XIA HUA, ALEXANDER SINYUKOV, ANDREW TRAVERSO, DMITRI VERONINE, KAI WANG, HUI XIA, WENLONG YANG, LUQI YUAN, ALEXEI SOKOLOV, MARLAN SCULLY, Physics Department and Institute for Quantum Science and Engineering, Texas A&M University, College Station, TX, 77843 — Measurements of surface enhanced coherent anti-Stokes Raman spectra (CARS) of cyclohexane are carried out. Random aggregates of gold nanoparticles for field enhancement were deposited on a glass substrate and were characterized using atomic force microscopy (AFM). Surface enhancement of the CARS signal by gold nanoparticles is observed. This technique can be used to detect low amounts of chemicals with a higher sensitivity compared to the conventional surface-enhanced Raman spectroscopy (SERS). The lowest detected concentration of cyclohexane in a thin film of methanol was 1%. However, it was not possible to detect any signal from the same sample of cyclohexane without gold nanoparticles using conventional CARS technique. Therefore, surface enhancement is necessary to achieve higher spectroscopy sensitivity. Further studies of nanostructure-enhanced electrical fields are required to quantitatively understand the observed effects and will be performed in the future.

¹We acknowledge the support of the Robert A. Welch Foundation (A-1261).

Xia Hua
Physics Dept and Institute for Quantum Science and Engineering,
Texas A&M University, College Station, TX, 77843

Date submitted: 27 Sep 2010

Electronic form version 1.4