Abstract Submitted
for the MAR13 Meeting of
The American Physical Society

Giant circular dichroism of a molecule in a plasmonic nanoparticle dimer[1] HUI ZHANG, A.O. GOVOROV, Ohio University — We report on giant circular dichroism (CD) of a molecule inserted into a plasmonic hot spot. Naturally occurring molecules and biomolecules have typically CD signals in the UV range, whereas plasmonic nanocrystals exhibit strong plasmon resonances in the visible spectral interval. Therefore, excitations of chiral molecules and plasmon resonances are typically off-resonant. Nevertheless, we demonstrate theoretically that it is possible to create strongly-enhanced molecular CD utilizing the plasmons. Specifically, by employing a nanoparticle dimer, we gain simultaneously a strong plasmonic enhancement and a shift of optical CD from the UV range to the visible. The associated mechanism of giant CD comes from the Coulomb interaction which is greatly amplified in a plasmonic hot spot. Two key factors play a role in the described effect: One is the Coulomb interaction within the molecule-dimer complex giving rise to the plasmon peak in the CD spectrum, whereas the other one is the plasmonic enhancement of the absorption process in a chiral molecule. We propose that, by using the hot spot effect and plasmon-induced CD signals, one can design optical sensors to study chirality of biomolecules.

[1]This work was supported by Volkswagen Foundation and NSF (project number CBET-0933415).

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Date submitted: 02 Nov 2012 Electronic form version 1.4