

Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Plasmons in nearly touching metallic nanoparticles: singular response in the limit of touching dimers ISABEL ROMERO, Donostia Intl Physics Center, DIPC, Donostia, Spain, JAVIER AIZPURUA, DIPC, Donostia, Spain, GARNETT W. BRYANT, NIST, Gaithersburg, MD, F. JAVIER GARCIA DE ABAJO, Unidad mixta CSIC-UPV/EHU and DIPC, Donostia, Spain — The response of gold nanoparticle dimers is studied near and beyond the limit where the particles are touching. As the particles approach each other, a dominant dipole feature is observed that is pushed into the infrared due to interparticle coupling and that is associated with a large pileup of induced charge in the gap region. Lower-frequency, higher-order modes are observed in near touching dimers. After touching, singular behavior is observed through the emergence of infrared absorption peaks, accompanied by huge charge pileup at the nanoparticles junction region. These results explain recent experiments on metallic nanoparticle dimers and are relevant in the design of nanoparticle-based sensors and plasmon circuits.

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Date submitted: 26 Nov 2005

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