

Plasmons in nearly Touching Metallic Nanoparticles: Singular Response in the Limit of Touching Dimers

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We study the optical properties of pairs of spherical gold nanoparticles for light incident with its polarization parallel to the interparticle separation vector. Both the absorption of this system and the light scattering strength exhibit resonant features that shift in frequency when the separation between particles is varied. Distances close to the point of particle percolation are discussed in detail, where a rich structure of resonant features shows up. The evolution of overlapping spheres from the point where they touch to the point where they merge into a single sphere shows a resonant feature that shifts towards the far infrared region immediately in the limit when the spheres touch at a single point.