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Effects of protein shell on properties of gold nanoparticles[1] ANH PHAN, Department of Physics, University of Illinois, 1110 West Green St, Urbana, Illinois 61801, USA, TRINH X. HOANG, Institute of Physics, 10 Daotan, Hanoi, Vietnam, DUSTIN A. TRACY, Department of Physics, University of Florida, Gainesville 32611, USA, LILIA M. WOODS, Department of Physics, University of South Florida, Tampa 33620, USA — Optical properties and surface interactions between nanoparticles present opportunities for many novel applications. Protein-conjugated nanoparticles are of particular interest in regards to various medical applications. Theoretical investigations are presented of protein-coated gold nanoparticles using the Mie theory and the coupled dipole method. The Mie theory along with the absorption spectra can be used to quantitatively determine the number of protein bovine serum molecules that aggregate on the gold surfaces. The internal field of protein-conjugated gold nanoparticles remains constant for large wavelength of light due to screening from the protein shell. Effects from other nanoparticles significantly influence the peak position in the spectra. Our study shows the specific regimes in terms of optical characteristics where cascaded plasmon resonant field enhancement can be observed. Results for the maximum ratio of the internal field to the incident field is also obtained and discussed.

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