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Plasmonically enhanced photoluminescence dependence on thickness variations and other nanostructure geometries DAVID FRENCH, STEPHEN BAUMAN, DESALEGN DEBU, MADISON WHITBY, JOSEPH HERZOG, University of Arkansas — Plasmonic nanostructures produce local electric fields with values higher than that of the incoming light because when the light encounters the plasmonic nanostructure, it creates charge density oscillations, called plasmons. These plasmons create a local electric field which varies in strength by location. Near the edges and gaps of the nanostructure, the electric field is amplified, and a stronger electric field than that of the incoming light is created. These enhanced electric fields make possible signal amplification of otherwise very weak signals. Amplification of weak signals allows for single molecule spectroscopy such as surface-enhanced Raman spectroscopy. In this paper, various structure geometries are combined with cadmium-selenide quantum dots in order to study the effect of the plasmonic enhancement on photoluminescence. The geometries of the structures have been varied by size, allowing for the tunability of the structures for desired wavelengths. Photoluminescence, although different from Raman spectroscopy, still allows for the examination of the increase of the local enhancement of the electric field. This work plans to experimentally verify numerical simulations of local enhancement for these various geometries.

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