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Hybridizing plasmonic nanostructures with Quantum Dots

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Plasmonic nanostructures have attracted extensive research interest due to their enhanced light-matter interactions. Plasmonic induced surface plasmon resonance properties enable strong, size- and shape-dependent light absorption and scattering, as well as near-field amplification. Hybrid nanostructures containing self-assembled gold nanoparticles (Au NPs) embedded in a solid matrix of PbS quantum dots (QDs) have been developed for use in optoelectronic devices. As many studies have shown, this integration of Au NPs into PbS QDs influences the functionality of the devices by improving both their optical and electrical properties. Grazing-incidence small-angle X-ray scattering and scanning electron microscopy are used to investigate the morphology and spacing of Au NPs in the hybrid structure. Optical characterization of the different Au NP sizes is performed with UV-vis absorption measurements and (I-V) curves are taken for the investigation of the electrical properties, revealing the potential performance improvement of the optoelectronic device.

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