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Nanocrystal optoelectronic devices by plasmon-based optical trapping KENNETH EVANS, Rice University, Applied Physics Graduate Program, DANIEL WARD, Rice University, Department of Physics and Astronomy, GAUTAM KINI, MICHAEL WONG, Rice University, Department of Chemical and Biomolecular Engineering, DOUGLAS NATELSON, Rice University, Department of Physics and Astronomy — Optical trapping is an important tool for studying and manipulating nanoscale objects. In conventional laser trapping, the trapping volume is diffraction limited. Recent experiments have shown that subwavelength control of nanoparticles can be achieved by using plasmonic nanostructures, rather than using the laser directly, to generate the electric fields necessary for trapping. We present a numerical model describing the trapping forces on an individual semiconducting nanocrystal in a nanoscale metallic junction, and discuss initial experimental results. Calculations of the fields are performed in COMSOL, a commercial finite element solver package, and the trapping forces are computed using the full Maxwell stress tensor formalism. We propose the use of plasmonic optical trapping in this geometry as a method to fabricate electrically driven, single nanocrystal light-emitting devices.

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