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Inelastic electron tunneling -induced light emission from a metal - quantum dot - metal double barrier tunnel junction ANTTI MAKINEN, ALAN WAN, JAMES LONG, Naval Research Laboratory, Washington, DC 20375 — A double barrier tunnel junction formed by a scanning tunneling microscope (STM) tip together with the substrate-tethered quantum dots provides a flexible architecture to explore the characteristics of envisaged nanoparticle-based optoelectronic devices. STM-induced light emission (STM-LE) measurements of ligand-capped CdSe/ZnS quantum dots, tethered to a gold substrate, reveal a light generation mechanism, which is driven by inelastic electron tunneling (IET) at a threshold voltage. The threshold voltage for STM-LE is found to depend on the optical gap of the quantum dots, stipulating a simple energy conservation rule for light emission through IET.

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