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Quantum dots: from theory to applications

Abstract:We discuss optical properties of various types of nanoclusters called quantum dots and their applications in photovoltaics. We show that nanoparticles consisting of a dielectric core and metallic shell layer can be designed to produce a narrow optical window by employing a Fano resonance phenomenon. We consider a mechanical model that provides a transparent interpretation of the plasmon interactions in the dipole approximation of the Mie theory for optical response of these nanoparticles.