Physics > Optics

Metallo-dielectric hybrid antennas for ultrastrong enhancement of spontaneous emission

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We devise new optical antennas that reduce the excited-state radiative lifetimes of emitters to the order of 100 femtoseconds while maintaining quantum efficiencies of about 80% at a broadband operation. Here, we combine metallic nanoparticles with planar dielectric structures and exploit design strategies from plasmonic nanoantennas and concepts from Cavity Quantum Electrodynamics to maximize the local density of states and minimize the nonradiative losses incurred by the metallic constituents. The proposed metallo-dielectric hybrid antennas promise important impact on various fundamental and applied research fields, including photophysics, ultrafast plasmonics, bright single photon sources and Raman spectroscopy.

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