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Polarization and Angle Dependent Spontaneous Emission Rates in Hybrid Metal-Semiconductor Nanostructures YIKUAN WANG, TIANYU YANG, MARK TUOMINEN, MARC ACHERMANN, University of Massachusetts, ACHERMANN COLLABORATION, TUOMINEN COLLABORATION — We are interested in exciton-plasmon interactions between semiconductor nanocrystals (NCs) and a gold nanodisc array. Using angle resolved white-light transmission spectroscopy we identified localized in- and out-of-plane surface plasmon (SP) resonances in the gold array. Upon depositing CdSe/ZnS (core/shell) NCs on the metal disc array, we measured photoluminescence (PL) decay rates of the NCs as a function of emission direction and polarization by time-correlated single photon counting technique. Since the wavelengths of the selected NCs matched the out-of-plane SP resonance wavelengths of gold array, the spontaneous emission of the NCs is strongly dependent on detection angles and polarizations. The in-plane, *s*-polarized PL measurements are independent on detection angles, and can be described by the PL decay dynamics of two NC subsets: from NCs on the dielectric substrate and from NCs on the gold nanodiscs that experience non-radiative quenching by the metal structures. The out-of-plane, *p*-polarized PL measurements show an increase of the PL amplitude and an accelerated PL decay, both caused by SP-induced enhancement of the spontaneous emission rate.

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