Electronic Supplementary Material (ESI) for Physical Chemistry Chemical Physics.

Supporting Information for

Polymer Spacer Tunable Purcell-Enhanced Spontaneous Emission in Perovskite Quantum Dots Coupled to Plasmonic Nanowire Network

Hanmei Li, Futao He, Chuankun Ji, Weiwei Zhu, Yuanqing Xu, Wenkai Zhang,* Xianrui Meng,* Xiaomin Fang and Tao Ding

Institute of Functional Organic Molecular Engineering, Henan Engineering Laboratory of Flame-Retardant and Functional Materials, College of Chemistry and Chemical Engineering, Henan University, Kaifeng 475004, P. R. China.

*Wenkai Zhang, E-mail: zhangwenkai@henu.edu.cn
*Xianrui Meng, E-mail: mengxianrui@henu.edu.cn

PVA thickness measurement

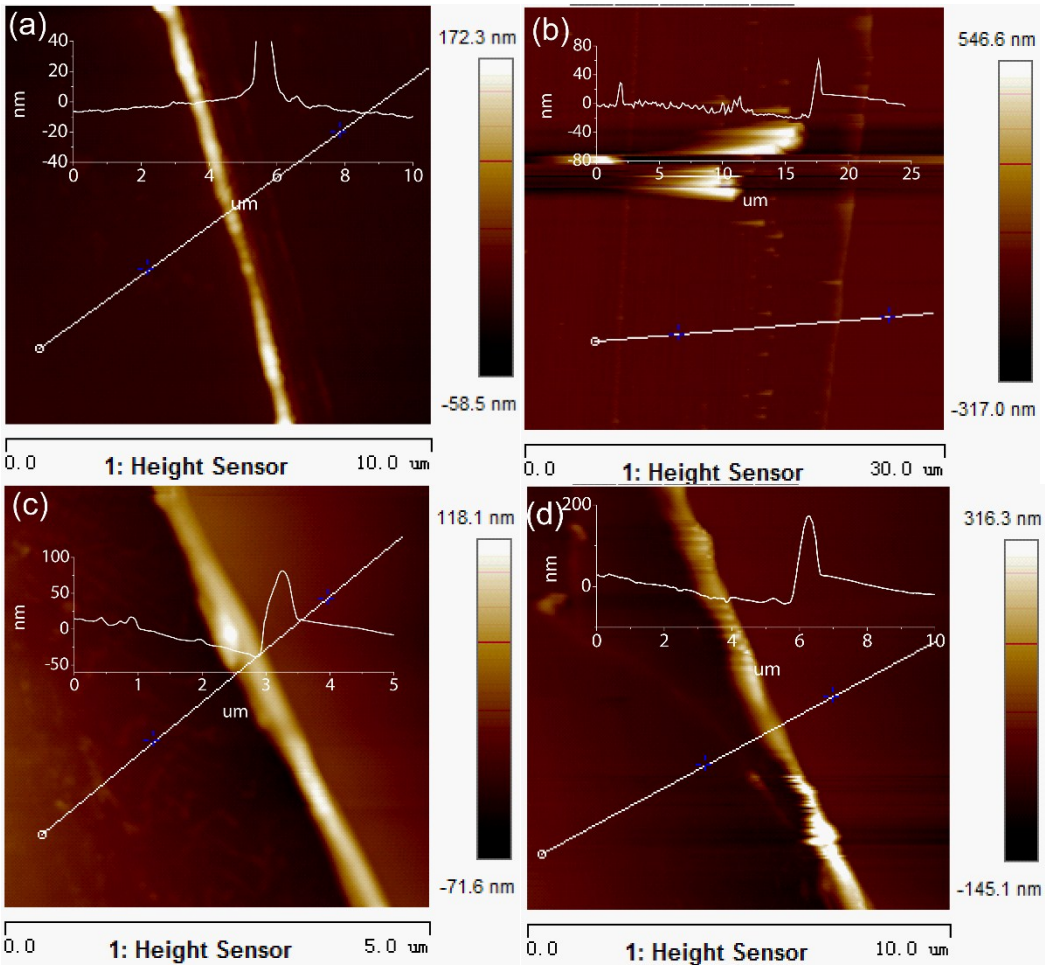

Figure S1 Ultrathin PVA films spin-coated from solution with different polymer concentration: (a) 0.2 mg·mL^{-1}; (b) 0.4 mg·mL^{-1}; (c) 0.6 mg·mL^{-1}; (d) 1.0 mg·mL^{-1}. Inset show the height profiles along the white lines. To measure the thickness of PVA film, the border was produced by scratching the film with a wood stick.

Determination method of the radiative rate, nonradiative rate and the quantum yield

Using TRPL spectroscopy, the radiative and nonradiative decay rates of emitters in the vicinity of plasmonic nanoparticles can be determined quantitatively. The PL QY can be written as

$$QY = \gamma_r/\gamma_T = \zeta \int_0^\infty a(t) e^{-\gamma_T t} dt = \zeta a_0/\gamma_T \tag{S1}$$

where $a(t)$ is the measured fluorescence transient (as shown in Figure 3a in the main text), ζ is a collection efficiency factor and a_0 is the peak intensity or fluorescence signal at time $t = 0$ in the time-resolved fluorescence curve. For constant collection and excitation efficiency, from Eq. (S1) follows the simple relation $\gamma_r = \zeta a_0$. Once the radiative decay rates γ_r are known, we can deduce the nonradiative rates (γ_{nr}) using the experimentally determined total decay rates: $\gamma_T = 1/\tau_{ave} = \gamma_r + \gamma_{nr}$ and the QY of the coupling system is given by $QY = \gamma_r/\gamma_T$. In order to check the accuracy of this method, a comparison of the QY enhancement factor and the integrated area ratio between decay curves is made: $I_m/I_0 = QY_m/QY_0$, where subscripts "m" and "0" represent coupled and uncoupled samples, respectively. In this way, the decay rate of the radiative decay channel, the nonradiative decay channel, and the quantum yield of the hybrid system can be accurately obtained.