

Electronic Supplementary Information

Enhancing Photoluminescent Performance of Perovskite Quantum Dots with Plasmonic Nanoparticles: Insights into Mechanisms and Light-Emitting Applications

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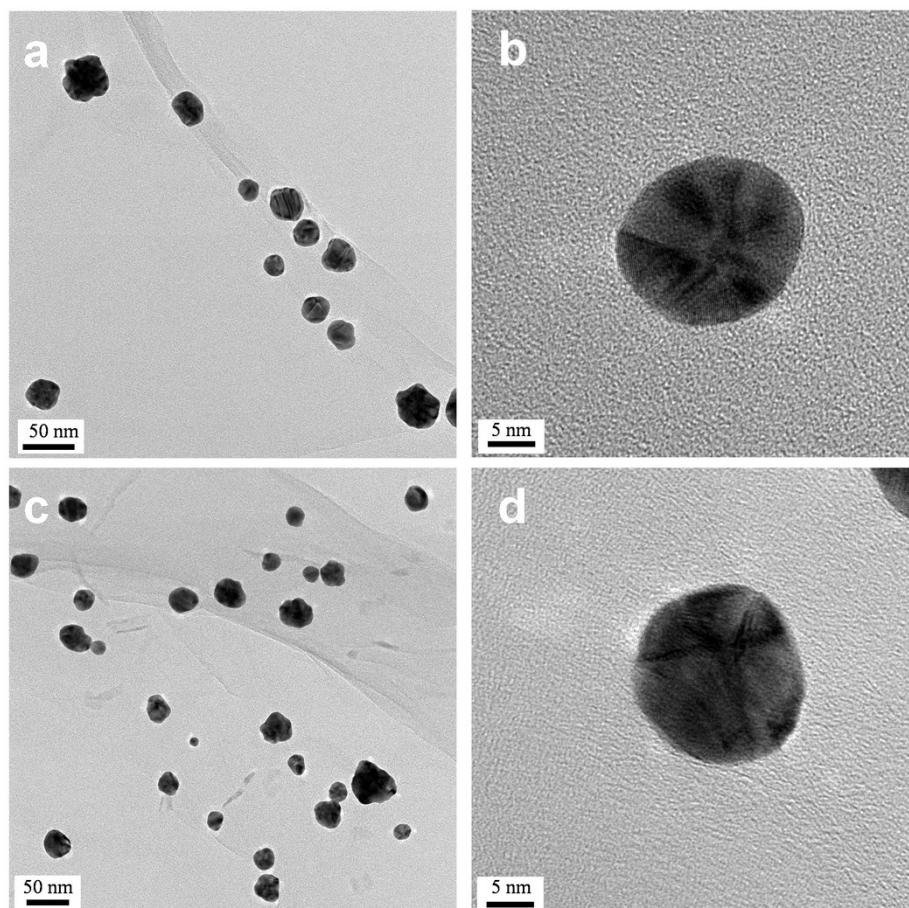


Figure S1 TEM images of the Au NPs: (a,b) AuNP-GO; (c,d) AuNP-PEGGO nanocomposites. High-resolution TEM images: (b) AuNP-GO; (d) AuNP-PEGGO nanocomposites.

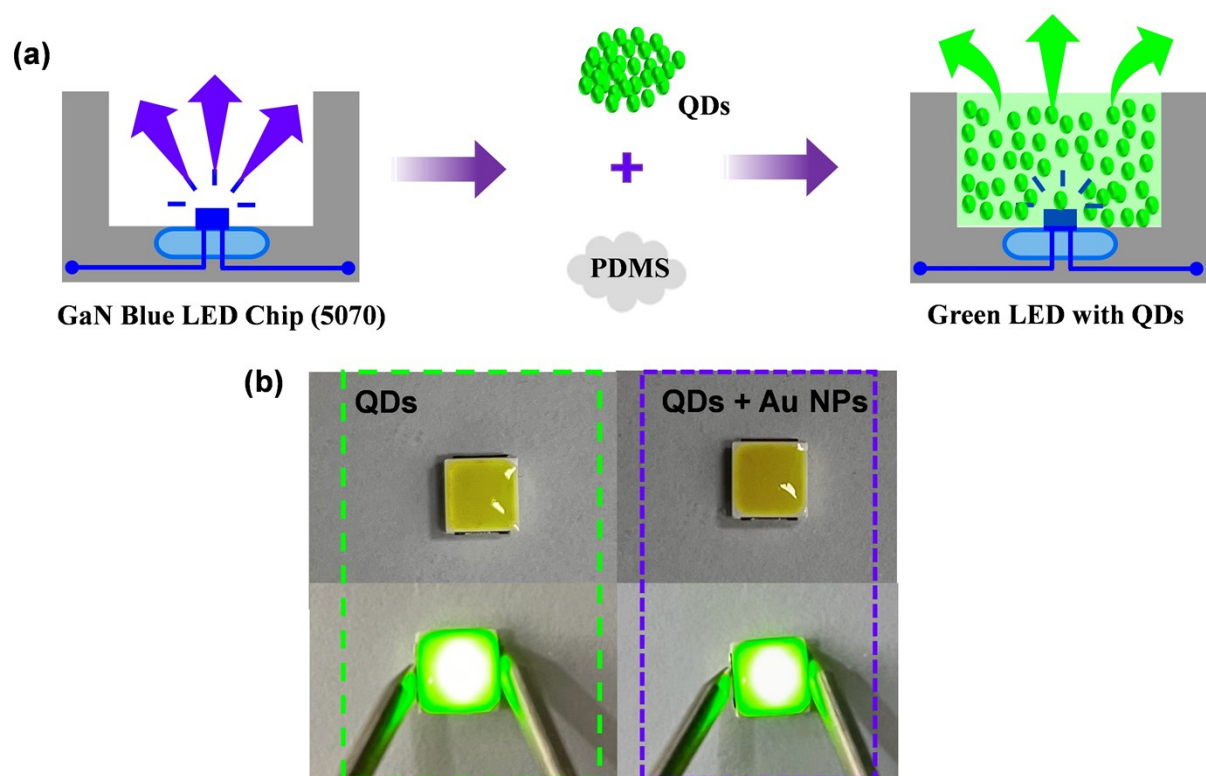


Figure S2 (a) Schematic representation of the process flow for the "in-chip" LED devices. (b) (Left) The LED prepared without Au NPs and (Right) the LEDs prepared with Au NPs. (Upper) LED images without any external bias and (Lower) LED images under electrical biases.

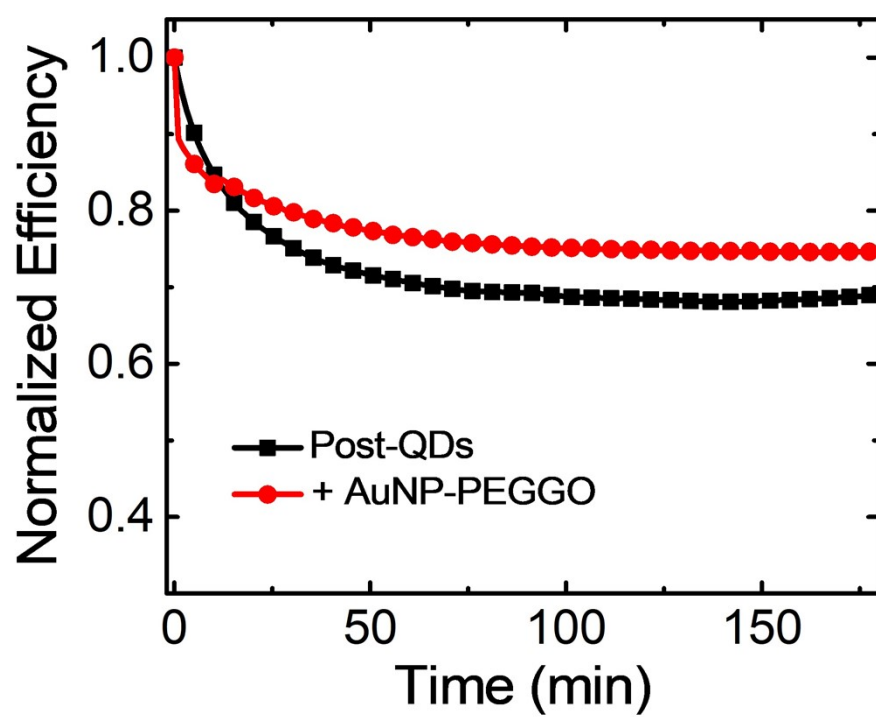


Figure S3 The normalized time-dependent efficiencies of the LEDs prepared with and without AuNP-PEGGO.

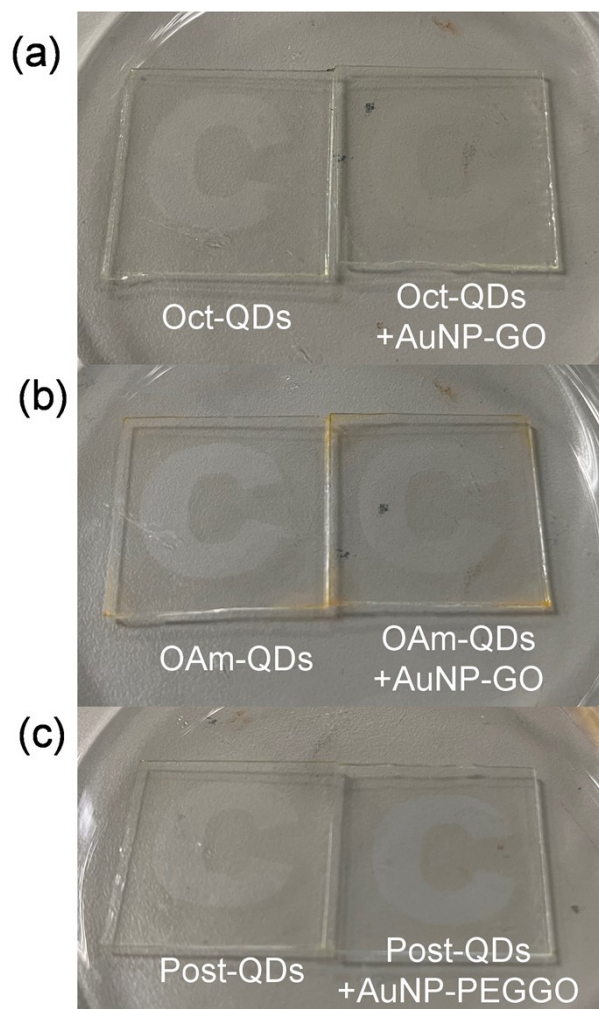


Figure S4 The images of the samples with the pattern "C" under normal indoor lighting conditions. In each image, the left samples are the PQD-PNC films prepared with Au NPs and the right samples are the films prepared with Au NPs.

Table S1 Photoluminescence decay parameters for Oct-QDs and the mixtures comprising of different concentrations of Oct-QDs and Au NPs.

Materials	A ₁ [%]	τ_1 [ns]	A ₂ [%]	τ_2 [ns]	τ_{avg} [ns]	PLQY [%]
Oct-QDs	67.78	7.33	29.64	24.20	12.46	84.8
+AuNP-GO 2 μ g/mL	60.31	4.69	39.69	15.74	9.08	87.3
+AuNP-GO 4 μ g/mL	55.40	4.31	44.01	14.32	8.74	95.4
+AuNP-GO 6 μ g/mL	57.55	9.23	38.53	40.70	21.84	84.2

Table S2 Photoluminescence decay parameters for the three types of OAm-QDs and the mixtures comprising of different concentrations of OAm-QDs and Au NPs.

Materials	A ₁ [%]	τ_1 [ns]	A ₂ [%]	τ_2 [ns]	τ_{avg} [ns]	PLQY [%]
OAm-QDs	63.02	9.83	36.98	43.66	22.34	77.4
+AuNP-GO 2 μ g/mL	56.15	8.36	43.85	34.78	19.94	80.6
+AuNP-GO 4 μ g/mL	56.40	7.48	43.60	31.97	18.16	90.0
+AuNP-GO 6 μ g/mL	61.99	10.07	38.01	36.94	20.28	85.0
+AuNP-PEGGO 2 μ g/mL	59.48	7.19	40.52	38.06	19.70	80.7
+AuNP-PEGGO 4 μ g/mL	56.76	6.73	43.24	34.08	18.56	82.5
+AuNP-PEGGO 6 μ g/mL	62.00	8.50	38.00	40.27	20.57	78.4

Table S3 Photoluminescence decay parameters for the three types of Post-QDs and the mixtures comprising of different concentrations of Post-QDs and Au NPs.

Materials	A ₁ [%]	τ_1 [ns]	A ₂ [%]	τ_2 [ns]	τ_{avg} [ns]	PLQY [%]
Post-QDs	42.50	5.09	57.50	14.77	10.65	94.5
+AuNP-PEGGO 2 $\mu\text{g/mL}$	38.68	2.80	61.32	14.27	9.83	98.5
+AuNP-PEGGO 4 $\mu\text{g/mL}$	37.99	2.68	62.01	12.43	8.72	98.7
+AuNP-PEGGO 6 $\mu\text{g/mL}$	65.17	5.28	34.83	23.45	11.61	93.4

Table S4 Radiative and non-radiative rate constants for the Oct-QDs and the mixtures comprising of different concentrations of Oct-QDs and Au NPs.

Materials	Quantum yield	τ_{avg} [ns]	k_r [10^8 s^{-1}]	k_{nr} [10^8 s^{-1}]
Oct-QDs	0.848	12.46	0.68	0.12
+AuNP-GO 2 $\mu\text{g/mL}$	0.873	9.08	0.96	0.14
+AuNP-GO 4 $\mu\text{g/mL}$	0.954	8.74	1.09	0.05
+AuNP-GO 6 $\mu\text{g/mL}$	0.842	21.84	0.39	0.07

Table S5 Radiative and non-radiative rate constants for the OAm-QDs and the mixtures comprising of different concentrations of OAm-QDs and Au NPs.

Materials	Quantum yield	τ_{avg} [ns]	k_r [10^8 s^{-1}]	k_{nr} [10^8 s^{-1}]
OAm-QDs	0.774	22.34	0.35	0.10
+AuNP-GO 2 $\mu\text{g/mL}$	0.806	19.94	0.40	0.10
+AuNP-GO 4 $\mu\text{g/mL}$	0.900	18.16	0.50	0.06
+AuNP-GO 6 $\mu\text{g/mL}$	0.850	20.28	0.42	0.07
+AuNP-PEGGO 2 $\mu\text{g/mL}$	0.807	19.70	0.41	0.10
+AuNP-PEGGO 4 $\mu\text{g/mL}$	0.825	18.56	0.44	0.09
+AuNP-PEGGO 6 $\mu\text{g/mL}$	0.784	20.57	0.38	0.11

Table S6 Radiative and non-radiative constants for the Post-QDs and the mixtures comprising of different concentrations of Post-QDs and Au NPs.

Materials	Quantum yield	τ_{avg} [ns]	k_r [10^8 s^{-1}]	k_{nr} [10^8 s^{-1}]
Post-QDs	0.945	10.65	0.89	0.05
+AuNP-PEGGO 2 $\mu\text{g/mL}$	0.985	9.83	1.00	0.02
+AuNP-PEGGO 4 $\mu\text{g/mL}$	0.987	8.72	1.13	0.01
+AuNP-PEGGO 6 $\mu\text{g/mL}$	0.934	11.61	0.80	0.06