Enhanced photoluminescence of CsPbBr₃@Ag hybrid perovskite quantum dots

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S1 XRD pattern of CsPbBr3 nanocrystals prepared by ultrasoniction method



S2 TEM morphologies of CsPbBr_{3-x}Cl_x@Ag hybrid nanocrystals prepared by reacting CsPbBr₃ nanocrystals with AgCl at 24 h



S3 (a) absorption spectrum and (b) TEM of Ag nanospheres. The prepared Ag nanospheres show a strong SPR peak at 410 nm.



S4 Schematic diagrams of the 3D numerical model (not to scale)

Schematic diagrams of 3D numerical model of CsPbBr₃@Ag hybrid nanocrystals are shown in Fig. S3. In our numerical models, the diameter of the Ag nanosphere is set to 4 nm, and length of side of the cubic CsPbBr₃ nanocrystal is set to 20 nm. We used complex permittivity, $\varepsilon = \varepsilon_r + i\varepsilon_i$, to characterize the metal, with values taken from the experimental data of Johnson and Christy. The optical constant of CsPbBr₃ are taken as $\varepsilon = 2.3 + 0.1i$.[1] The surrounding medium was assumed to be hexane with refractive index n=1.37. Incident light, $E_{0z} \cdot \exp(-ik_x z)$, where $E_{0z} = 1$ V/m, polarized parallel to the z-axis, propagates along the x-axis. All the structures are excited by linearly polarized light with wavelengths of 400 nm. To suppress the noise reflected or scattered from the simulated boundaries, the outside boundaries of the calculated area were set to the perfectly matched layer. The whole numerical model was meshed with free tetrahedron. A sufficiently small mesh (0.1 nm) was used in the Ag nanospheres compared to the other domains of the model, where the maximum and minimum mesh sizes were set to 5 nm and 1 nm.



S5 Photoluminescence of CsPbBr₃@Ag hybrid nanocrystals obtained by reacting CsPbBr₃ nanocrystals with AgCl at different time in the dark field.



S6 Photoluminescence (a) and (b) absorption spectra of CsPbBr₃@Ag nanocomposite obtained by reacting CsPbBr₃ nanocrystals with AgBr. Unfortunately, decreased PL intensity of this kind of CsPbBr₃-Ag hybrid nanocrystals was observed compared with that of CsPbBr3 nanocrystals.

Reference

 Y. Dong, Y. Gu, Y. Zou, J. Song, L. Xu, J. Li, J. Xue, X. Li, H. Zeng. Improving all-inorganic perovskite photodetectors by preferred orientation and plasmonic effect, Small, 2016, 12, 5622– 5632