**Supporting information**

**Colloidal Synthesis and Optical Properties of All-inorganic Cs2CuCl4 Nanocrystals**

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**Table 1.** Summary of the Optical Performance of the lead and lead free Perovskite NCs.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Emitting materials | PL peak | FHWM | Fabrication technology | PLQY | Ref |
| CsPb(Cl/Br)3 | 452 nm | 23 nm | Hot injection | 60% | 8 |
| CsPb(Cl/Br)3 | 465 nm | 15 nm | Hot injection | 100% | 9 |
| Ni:CsPb(Cl/Br)3 | 470 nm | — | Modified recrystallization | 89% | 10 |
| Mn:CsPb(Cl/Br)3  | 466 nm | 17.9 nm | Hot injection | 44% | 11 |
| Cs3Bi2Br9 | 414 nm | 38 nm | Modified recrystallization | 22% | 13 |
| Cs3Sb2Br9 | 408 nm |  | modified supersaturated recrystallization | 51.2% | 15 |
| Cs3Cu2I5 | 445 nm | 63 nm | Hot injection | 87% | 16 |
| Ag：Cs2CuCl4 | 434 nm | 58 nm | Hot injection | 42% | This work |



**Figure S1.** (a) TEM images of the Cs3Cu2Br5 NCs. (b) UV/Vis absorption, PLE, and PL spectra of Cs3Cu2Br5 NCs. (c) XPS survey scan of Cs3Cu2Br5 NCs. (d,e,f) The high-resolution XPS spectra corresponding to Cs 3d, Cu 2p and Br 3d, respectively.



**Figure S2.** The FITR spectra of Cs2CuCl4 NCs.



**Figure S3.** PL spectra for Cs2CuCl4 NCs and Ag treated samples. (b) PL spectra for Cs2CuCl4 NCs and Cs2CuCl4-OLA.



Figure S4. Schematic model representing the emission mechanism.