Electronic Supplementary Material (ESI) for New Journal of Chemistry.

Supporting Information

Bi^{3+} and Sm^{3+} co-doped $Cs_2AgInCl_6$ perovskite microcrystals with co-enhancement of fluorescence emission

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Table S1. Element content measured by ICP-MS. The molar concentration of Bi^{3+} = 100%[Bi]/[In]; and the molar concentration of Sm^{3+} = 100%[Sm]/[In].

Sample Category	Precursor		Product (ICP-MS)	
	Sm^{3+}	Bi^{3+}	Sm^{3+}	Bi^{3+}
$Cs_2AgInCl_6$: Sm	20%	0%	0.61%	0%
$Cs_2AgBiCl_6$: Bi	0%	20%	0%	18.9%
$Cs_2AgInCl_6$: Bi-Sm	20%	20%	0.21%	20.7%

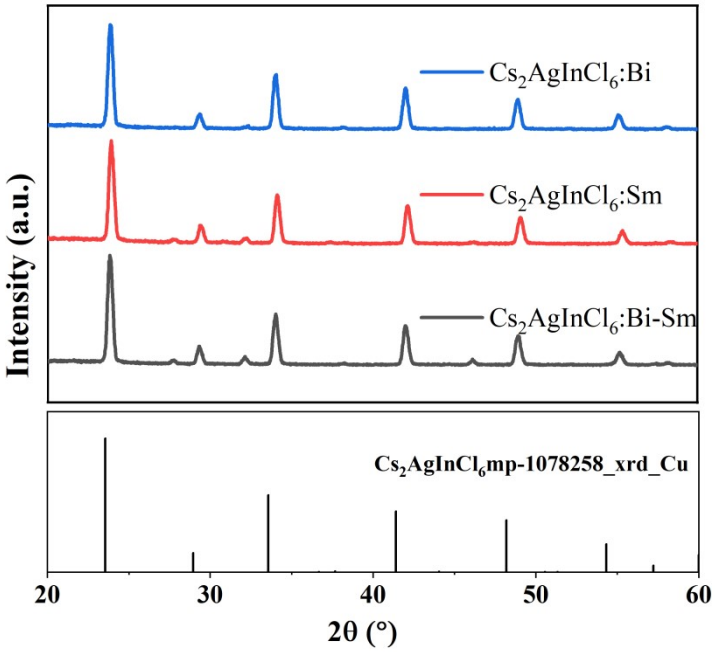

Figure S1. The PXRD patterns of $Cs_2AgInCl_6$: Bi, $Cs_2AgInCl_6$: Sm and $Cs_2AgBiCl_6$: Bi-Sm compared to the simulated PXRD patterns without doping.

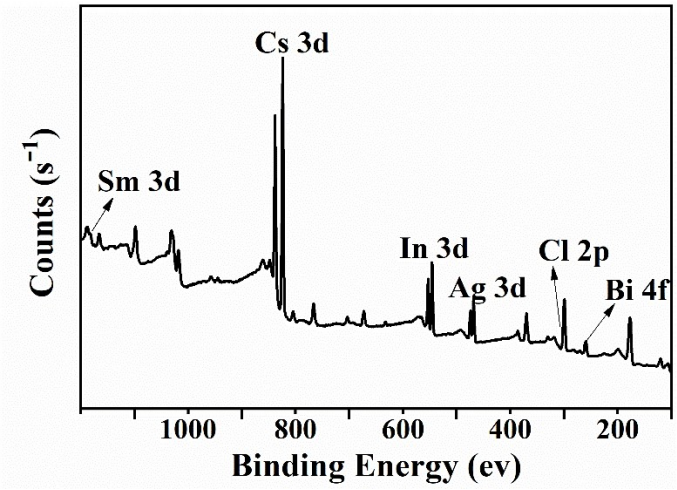

Figure S2. XPS spectrum of $Cs_2AgInCl_6$: Bi-Sm microcrystals.

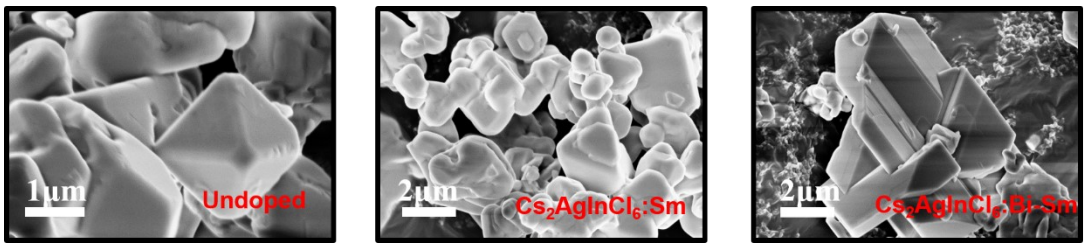

Figure S3. SEM images of the undoped, $Cs_2AgInCl_6$: Sm and $Cs_2AgInCl_6$: Bi-Sm microcrystals.

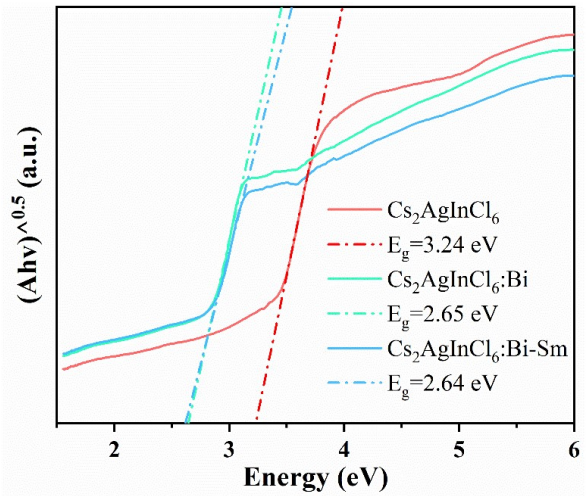

Figure S4. Tauc plot of diffuse absorption measurements of $Cs_2AgInCl_6$, $Cs_2AgInCl_6$: Bi and $Cs_2AgBiCl_6$: Bi-Sm microcrystals.

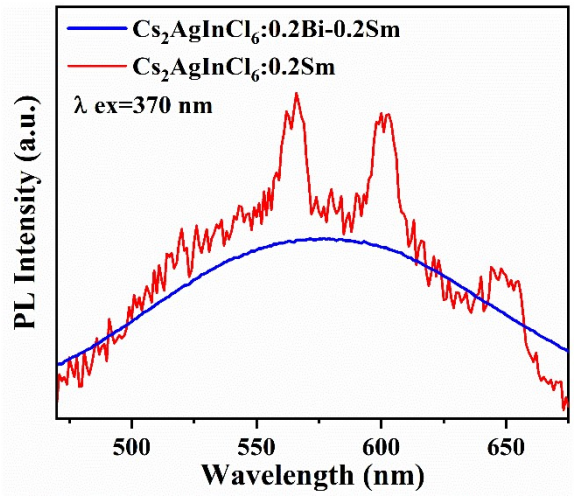

Figure S5. PL comparison spectra of $Cs_2AgInCl_6$:0.2Bi-0.2Sm and $Cs_2AgInCl_6$:0.2Bi excited at 370 nm. Intuitively, the 567 nm and 600 nm peaks arise after doping Sm^{3+} ions.

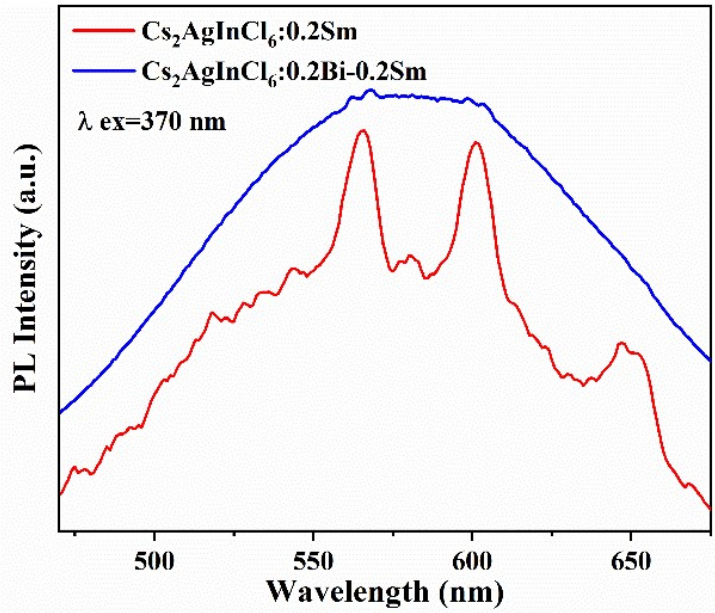

Figure S6. PL comparison spectra of $Cs_2AgInCl_6$:0.2Bi-0.2Sm and $Cs_2AgInCl_6$:0.2Sm excited at 370 nm. After co-doping Bi^{3+}, the emission peaks (567 nm and 600 nm) belonging to Sm^{3+} can still be observed, although the significant increase of PL intensity. Figure S5-S6 confirm that the 567 nm and 600 nm PL peaks arise from electronic transition of Sm^{3+} dopants.

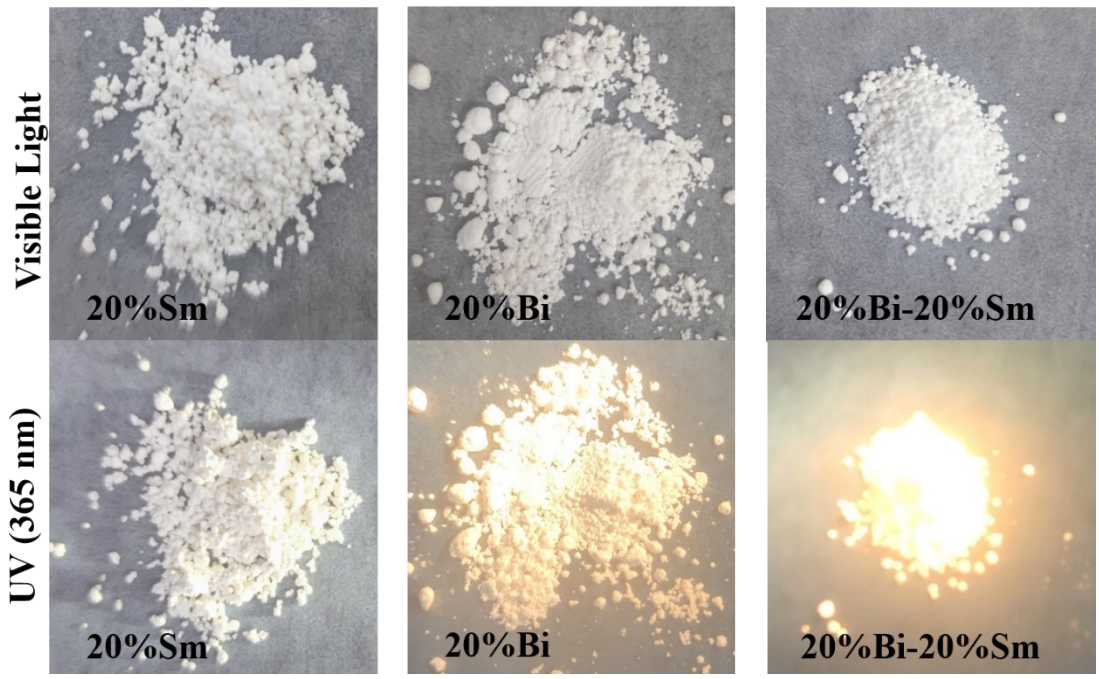

Figure S7. Photographs of Bi/Sm MCs under visible light and UV light (365 nm) excitation.

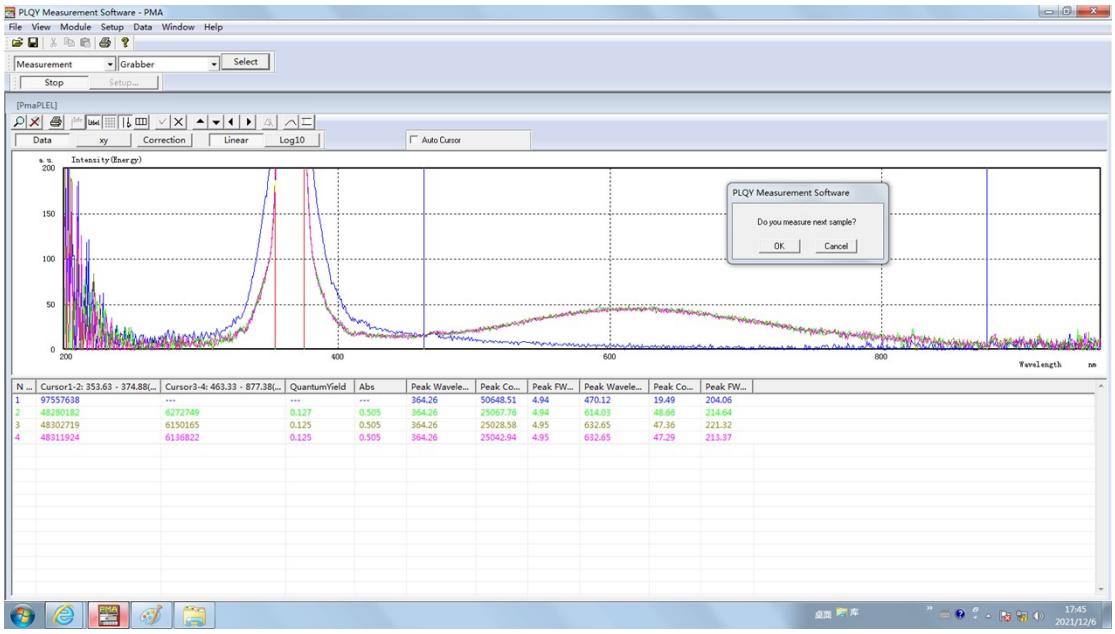

Figure S8. PLQY of $Cs_2AgInCl_6$: Bi MCs with average 12.6%.

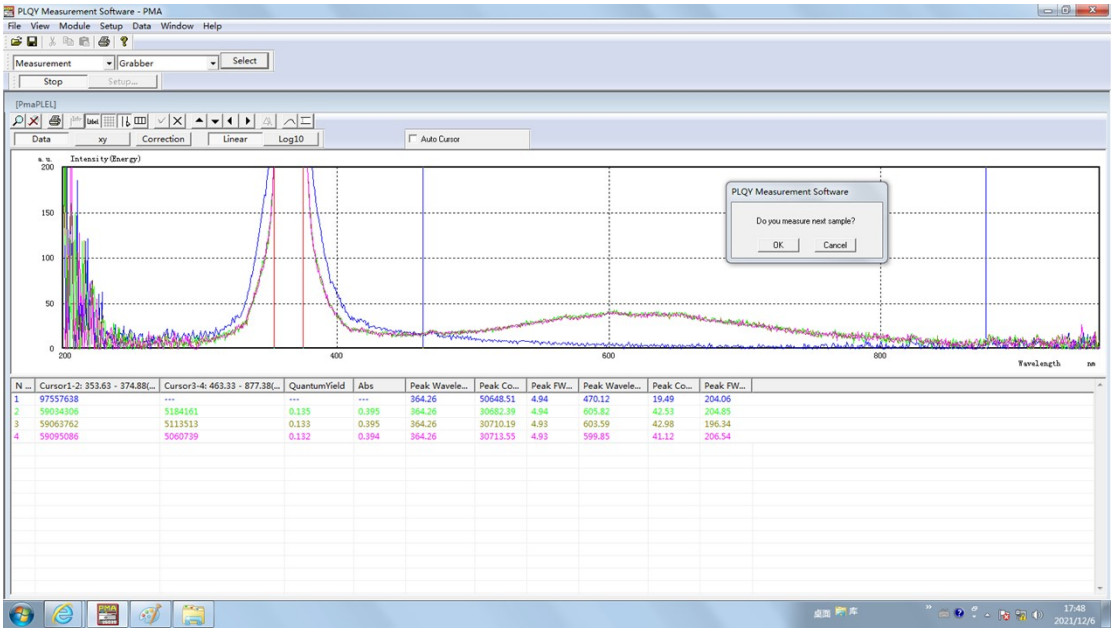

Figure S9. PLQY of $Cs_2AgInCl_6$: Bi-Sm MCs with average 13.4%.

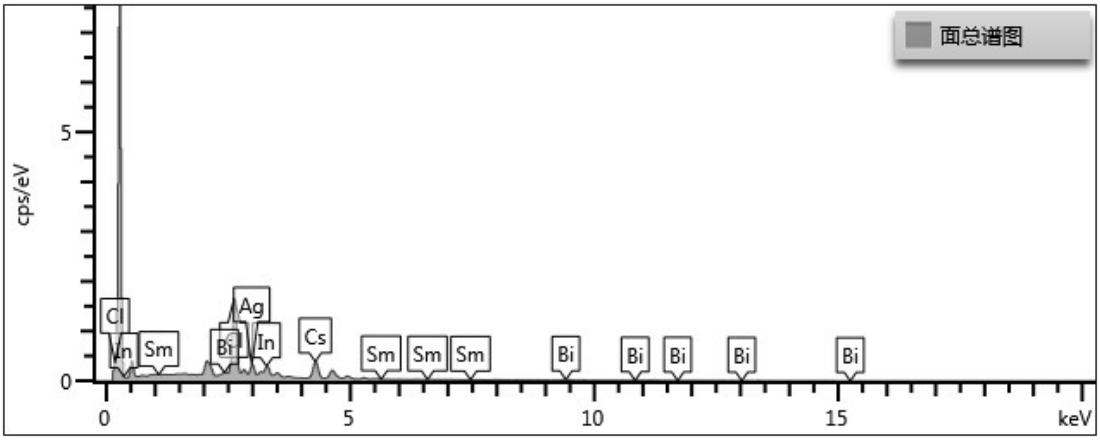

Figure S10. EDS spectrum recorded from the $Cs_2AgInCl_6$: Bi-Sm sample shows the existence of Bi, Sm elemental signals.

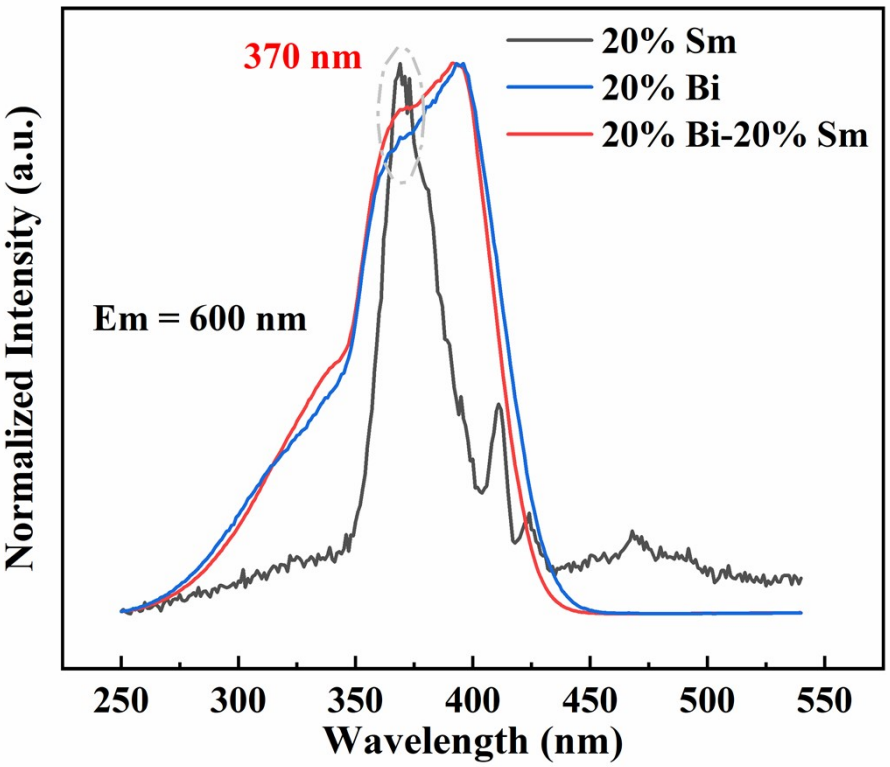

Figure S11. PLE spectra of $Cs_2AgInCl_6$: Bi-Sm, $Cs_2AgInCl_6$: Bi and $Cs_2AgInCl_6$: Sm samples obtained by monitoring emitting wavelength at 600 nm, and normalized to [0,100].