Supporting Information

Ligand strategy retarding monovalent copper oxidation toward achieving $Cs_3Cu_2I_5$ perovskite emitter with enhanced stability for lightings

Wenxuan Fan [a], Kaishuai Zhang [a], Shalong Wang [a], Leimeng Xu [a], Yingliang Liu [b*], Jizhong Song [a*]*

[a] Key Laboratory of Materials Physics of Ministry of Education, School of Physics and Microelectronics, Zhengzhou University, Daxue Road 75, Zhengzhou 450052, China.

[b] School of Materials Science and Engineering, Zhengzhou University, Daxue Road 75, Zhengzhou 450052, China.

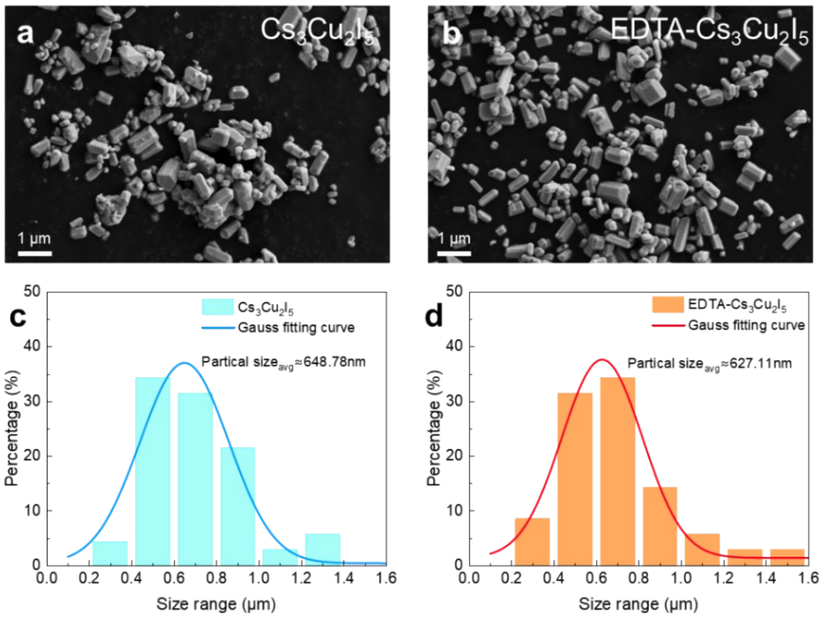

Figure S1 The SEM images of (a) pure and (b) EDTA-$Cs_3Cu_2I_5$. Particle size distribution histograms (c) pure and (d) EDTA-$Cs_3Cu_2I_5$.

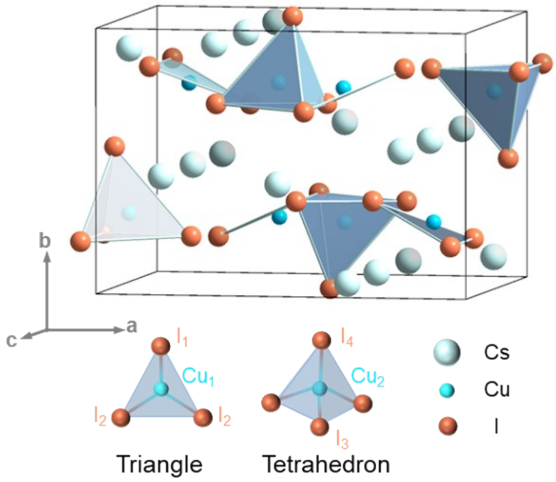

Figure S2 The crystal structure of $Cs_3Cu_2I_5$.

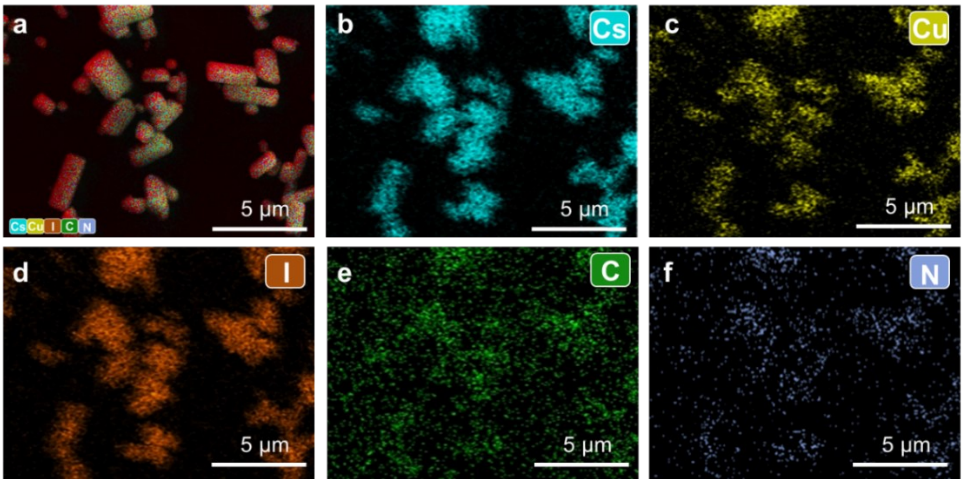

Figure S3 (a-f) EDS elemental mapping images of Cs, Cu, I, C and N of $Cs_3Cu_2I_5$ powder.

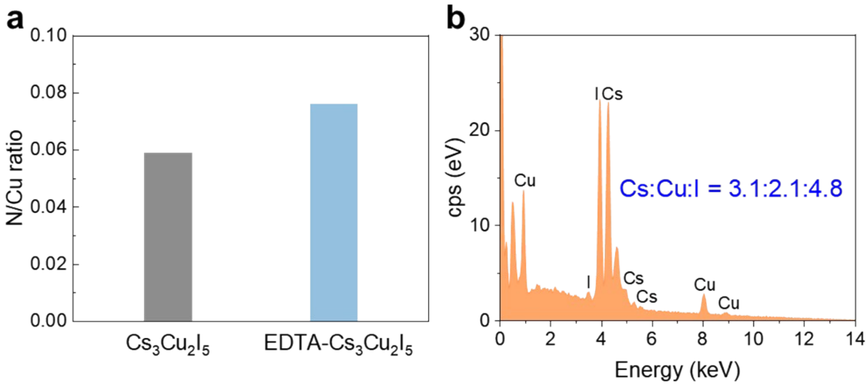

Figure S4 (a) The N/Cu ratio of $Cs_3Cu_2I_5$ and EDTA-$Cs_3Cu_2I_5$ samples. (b) The atomic ratio of EDTA-$Cs_3Cu_2I_5$ tested by EDS semiquantitative analysis.

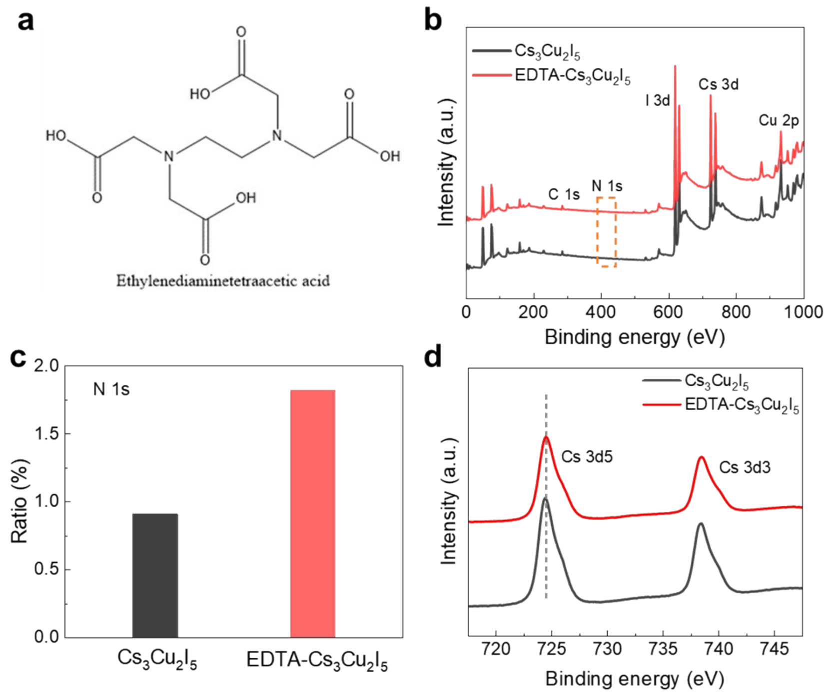

Figure S5 (a) The structural of EDTA. (b) X-ray photoelectron spectra (XPS) of $Cs_3Cu_2I_5$ and EDTA-$Cs_3Cu_2I_5$. (c)The N ration of $Cs_3Cu_2I_5$ and EDTA-$Cs_3Cu_2I_5$. (d) XPS spectra of Cs 3d.

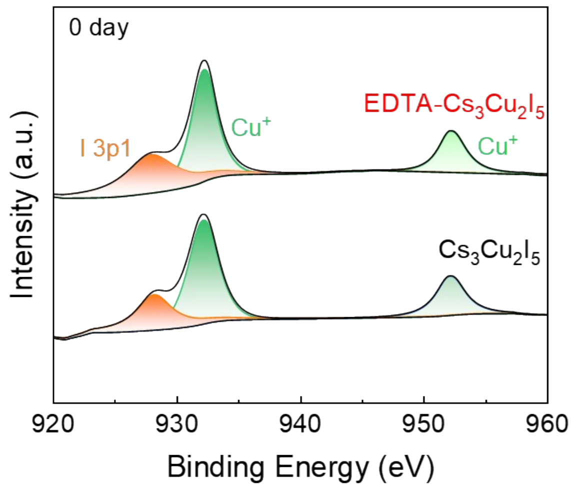

Figure S6 XPS Cu 2p spectra of pure and EDTA-treated samples.

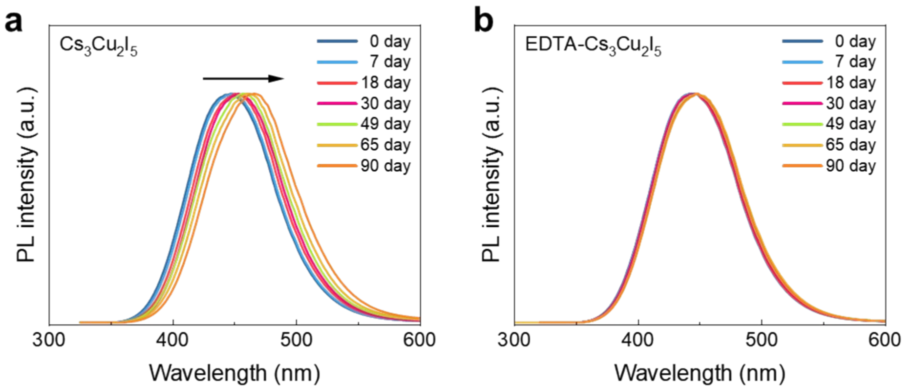

Figure S7 The PL spectra of (a) $Cs_3Cu_2I_5$ and (b) EDTA-$Cs_3Cu_2I_5$ at different storage periods in air ambient.

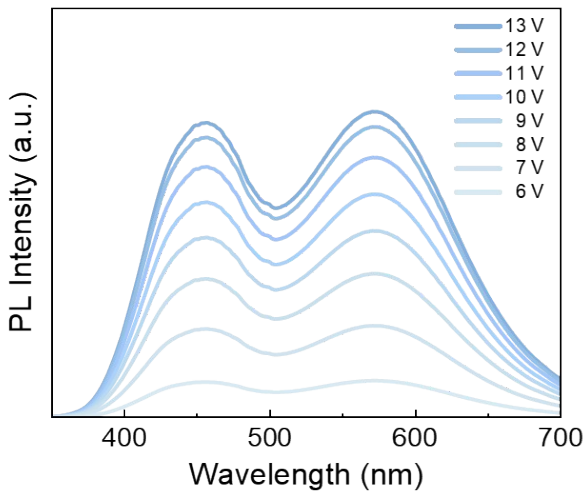

Figure S8 The PL spectra of EDTA-$Cs_3Cu_2I_5$-LED device under different driving voltage.

Table S1 Time-resolved PL decay curves of the pure and EDTA-treated $Cs_3Cu_2I_5$ samples.

Sample	A_1	τ_1 (ns)	A_2	τ_2 (ns)	τ_{avg} (ns)
$Cs_3Cu_2I_5$	511	637	2586	1289	1230
EDTA-$Cs_3Cu_2I_5$	457	406	2528	1089	1045