Supporting Information

An all-inorganic Li-doped $Cs_3Cu_2I_5$ single crystal for dual gamma ray and neutron detection applications

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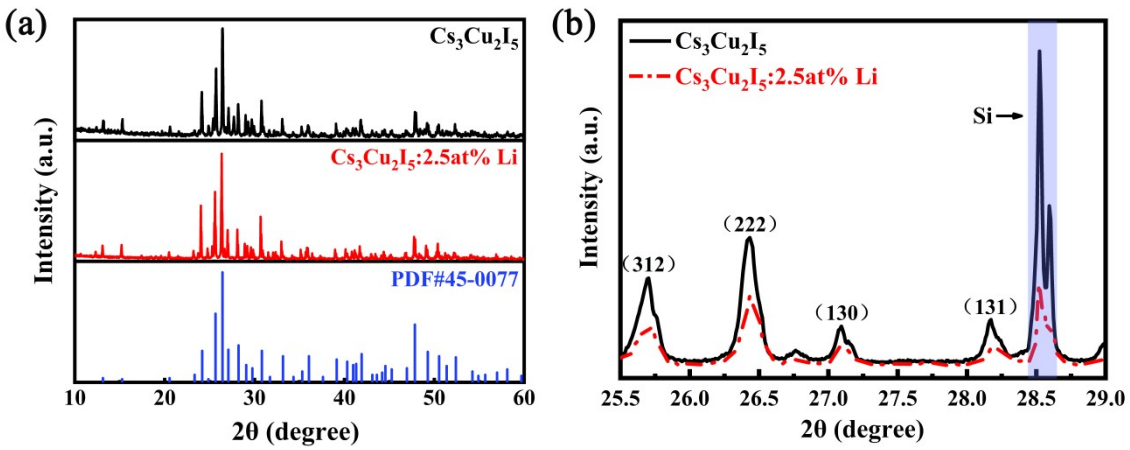

Figure S1. (a) Powder XRD patterns of both undoped and Li^+-doped $Cs_3Cu_2I_5$. (b) Narrow-angle powder X-ray diffraction with high-purity silicon as an internal standard.

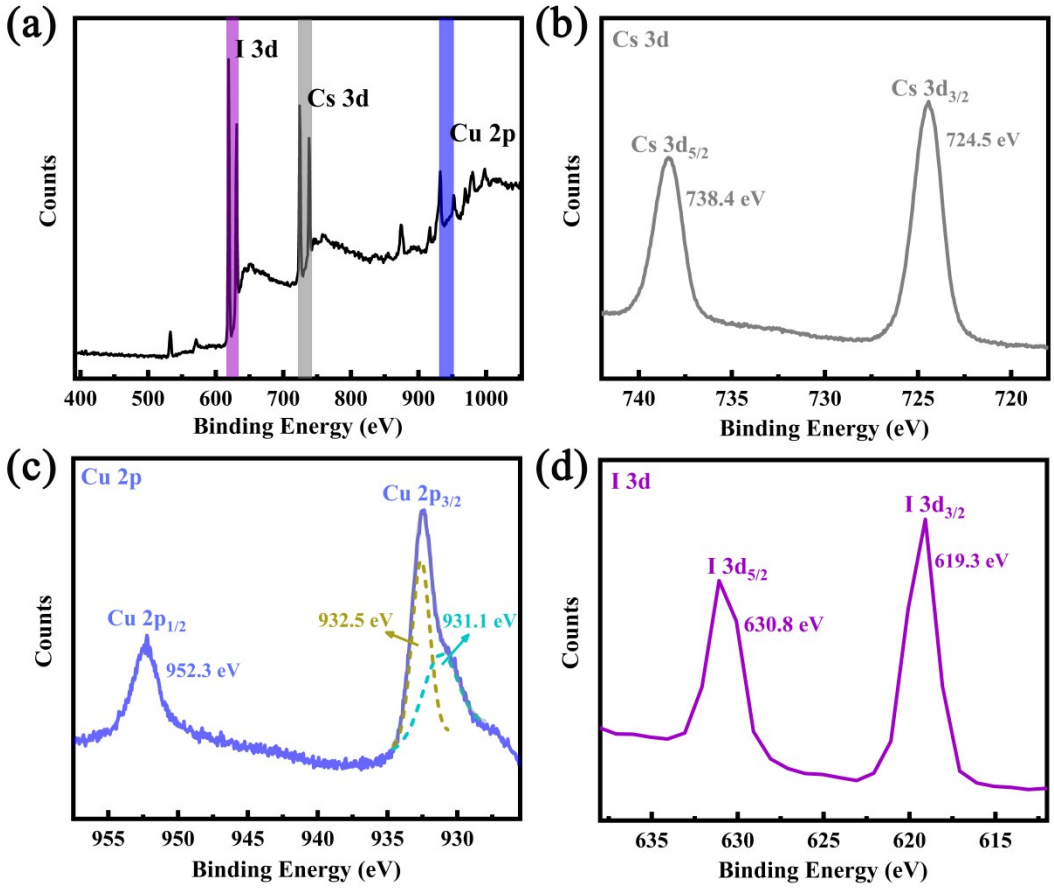

Figure S2. (a) XPS survey spectrum of $Cs_3Cu_2I_5$:Li. (b),(c) and (d) High-resolution XPS spectra of Cs 3d, Cu 2p and I 3d, respectively.

Table S1. ICP-OES results of $Cs_3Cu_2I_5$:Li with different Li^+ concentration.

Calculated concentration (at%)	Measured concentration (at%)
1.0	0.34
2.5	0.92

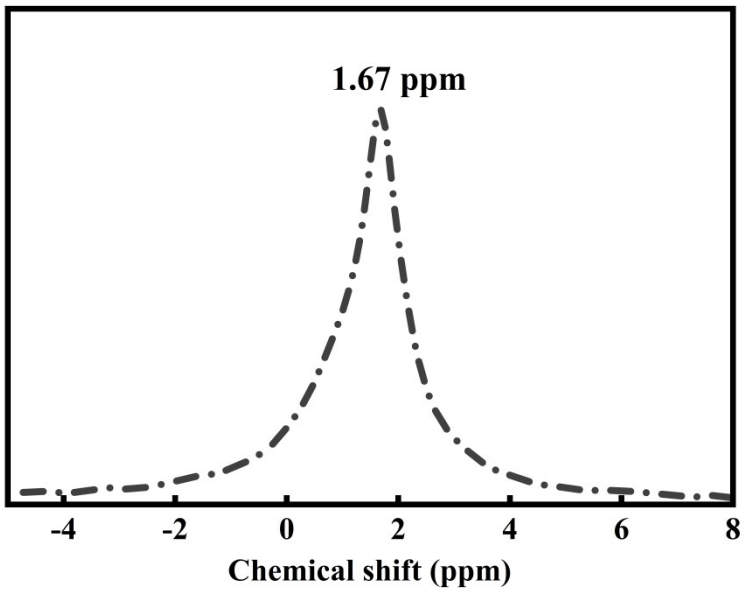

Figure S3. ^{7}Li NMR spectrum of $Cs_3Cu_2I_5$:Li.

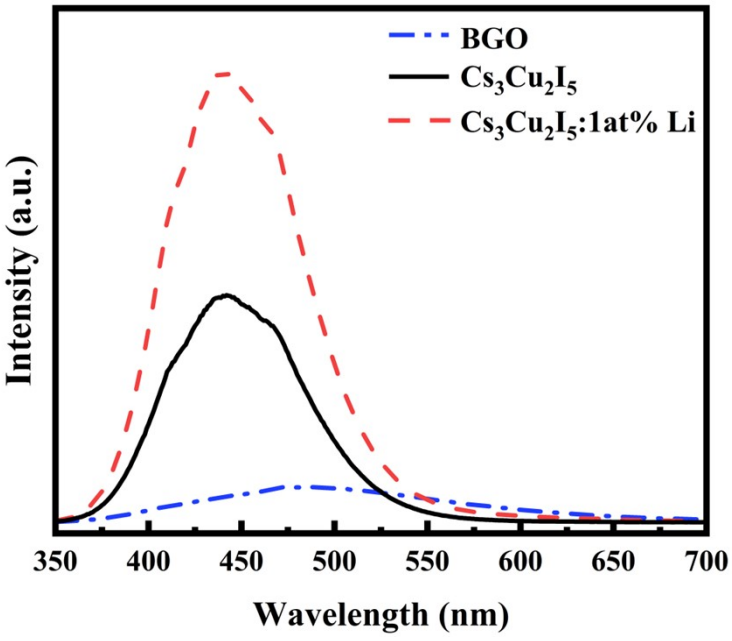

Figure S4. X-ray excited luminescence spectra of undoped and Li^+-doped $Cs_3Cu_2I_5$ single crystals and BGO.

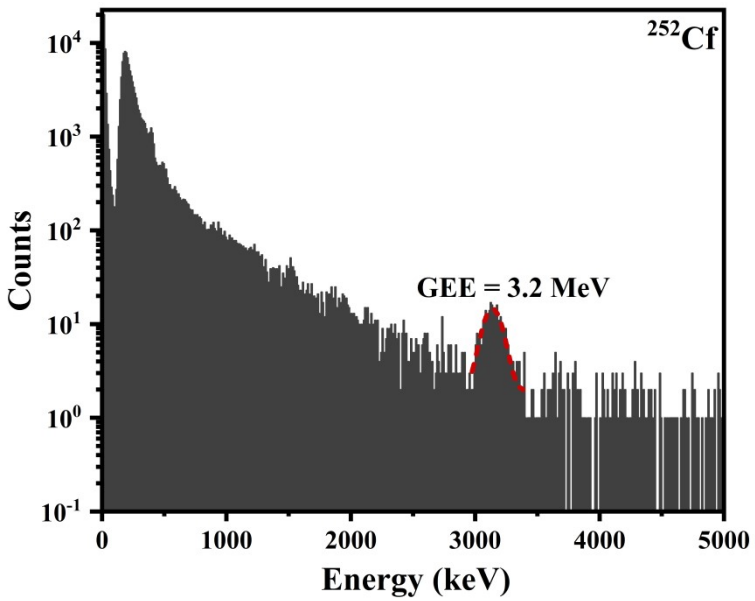

Figure S5. (a) Neutron energy spectra of 2.5at% Li^+-doped $Cs_3Cu_2I_5$ crystal under the excitation of ^{252}Cf source.

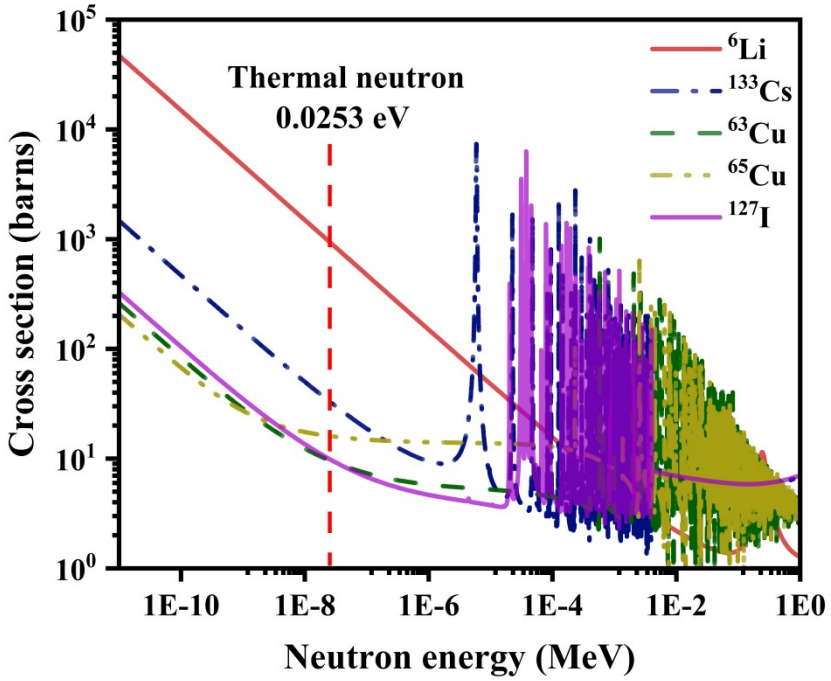

Figure S6. The relationship between neutron energy and reaction cross section of each element in Li^+-doped $Cs_3Cu_2I_5$.

Table S2. FOM values of 2.5at% Li^+-doped $Cs_3Cu_2I_5$ singe crystal under different prompt integration window combinations.

Prompt window (ns)	100	200	250	260	275	280	300	400	500
FOM	1.66	1.91	2.01	2.09	2.19	2.25	2.10	1.95	1.57