Supporting Information

Construction of Ag-doped Zn-In-S quantum dots toward white LEDs and 3D luminescent patterning

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Table S1. Properties of Cd-free QD-based White DC-LEDs in Previously Reported Works and present work

color-converting materials	LE (lm/W)	applied current (mA)	T_c (K)	CRI	ref
yellow $AgIn_5S_8$–ZnS NCs	53	60	3700	74	44
yellow YAG:Ce nanoparticles + red CIS/ZnS QDs	21.1	1200	3934	84.6	35
green $Ba_2SiO_4:Eu^{2+}$ +orange and red CIS/ZnS QDs	32.7	20	6552	90	18
green InP/ZnS + broad-band orange CIS/ZnS QDs	45.5	20	3803	90	39
yellow YAG:Ce +green and red $CuInS_2$ QDs	45.0	20	4764	93.1	36
yellow YAG:Ce +green and red $CuInS_2$ QDs	60.3	350	3649	81.6	36
green and red $CuInS_2$ NCs	67.8	20	4694	95.3	37
green Zn−Ag−In−S and red Zn−Cu−In−S QDs	31.2	20	3500	97	47
green Ag:Zn−In−S/ZnS d-QDs, YAG-05 and R635 phosphor	43.7	350	5031	90.3	Present work
YAG-05 and R635 phosphor	31.3	350	3677	83.2	

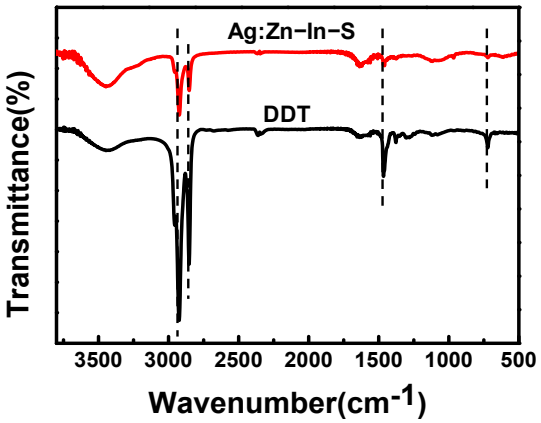

Fig S1. FT-IR spectra of Ag:Zn-In-S d-QDs and DDT.

The quantum yield calculation

The quantum yield measurements were performed with quinine sulfate in 0.10 M H_2SO_4 solution (literature quantum yield 0.54 at 360 nm) as the standard. The relative quantum yield values were calculated corresponding to the following equation:

$$Q = Qs\frac{I\,A_S n^2}{I_S\,A\,n_S^2}$$

Q is relative quantum yield; I is the measured integrated fluorescence emission intensity; A is the optical density measured at the excitation wavelength; n is the refractive index of corresponding solvents. The subscript "s" refers to the standard. Letters without subscript refer to the unknown quantum yield of as-prepared d-QDs. The refractive indexes of 0.10 M H_2SO_4 solution and toluene were 1.333 and 1.497, respectively (0.10 M H_2SO_4 solution was assumed as water). In order to minimize re-absorption effects, absorbance were kept under 0.05.

Table S2. Quantum yield measurements of Ag:Zn−In−S and Ag:Zn−In−S/ZnS d-QDs.

quinine sulfate	Qs	Is	As	n_s
	0.54	10986	0.0352	1.333
Ag:Zn−In−S	Q	I	A	n
	7%	1332.7	0.0308	1.497
Ag:Zn−In−S/ZnS	Q	I	A	n
	28%	4106.9	0.0313	1.497