Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C.

Electronic Supporting Information

Lanthanide ions (Eu^{3+}, Tb^{3+}, Sm^{3+}, Dy^{3+}) activated ZnO embedded zinc 2,5-pridinedicarboxylic metal organic frameworks for luminescent application

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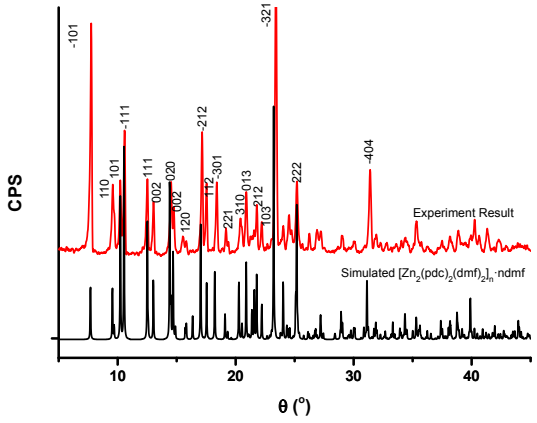

Figure S1 XRD pattern of Zn(pdc)-1 and simulated $[Zn_2(pdc)_2(dmf)_2]_n \cdot ndmf$.

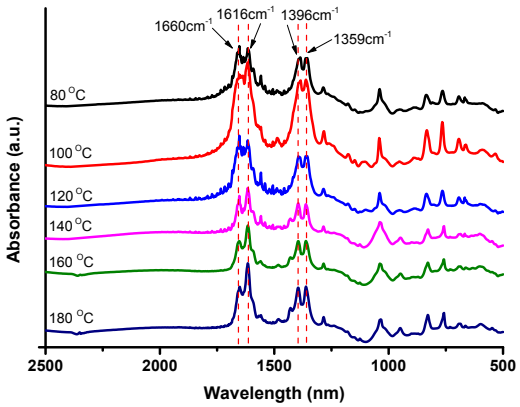

Figure S2 FTIR spectra of Zn(pdc)-1, Zn(pdc)-2, Zn(pdc)-3, Zn(pdc)-4, Zn(pdc)-5, Zn(pdc)-6.

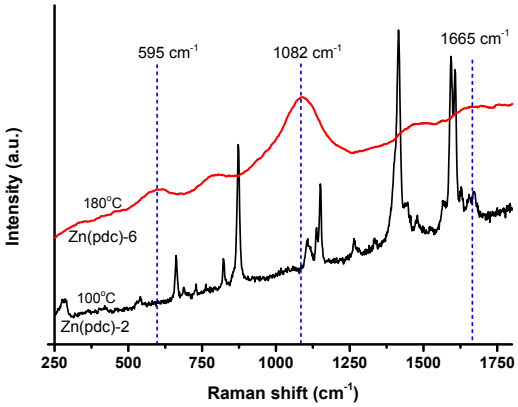

Figure S3 Raman spectra of Zn(pdc)-2 (synthesized at 100 °C) and Zn(pdc)-6 (synthesized at 180 °C)

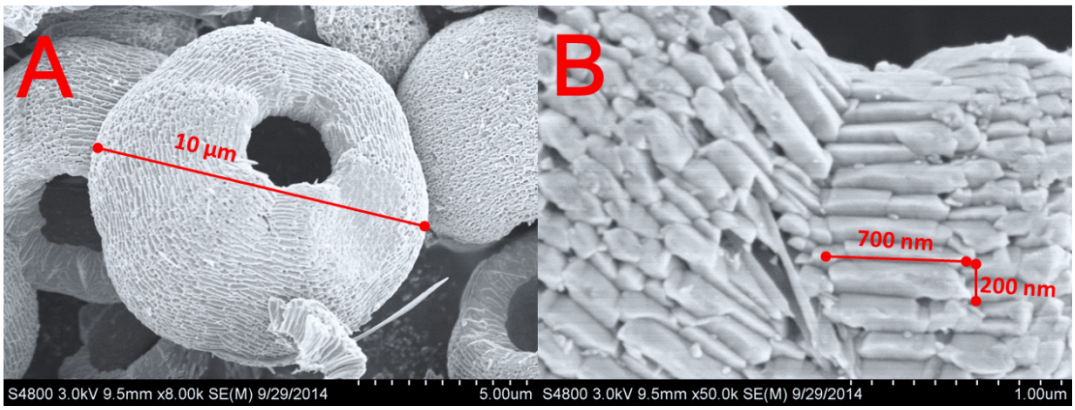

Figure S4 SEM of self-assembly ZnO superstructure.

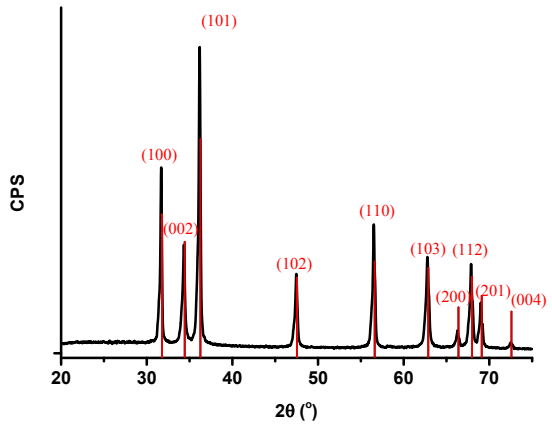

Figure S5 XRD pattern of self-assembly ZnO superstructure.

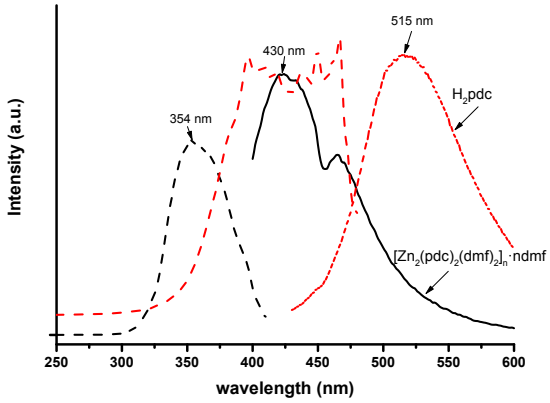

Figure S6 Excitation spectra (dash line) and photoluminescence spectra (solid line) of $[Zn_2(pdc)_2(dmf)_2]_n \cdot ndmf$ and H_2pdc ligand.

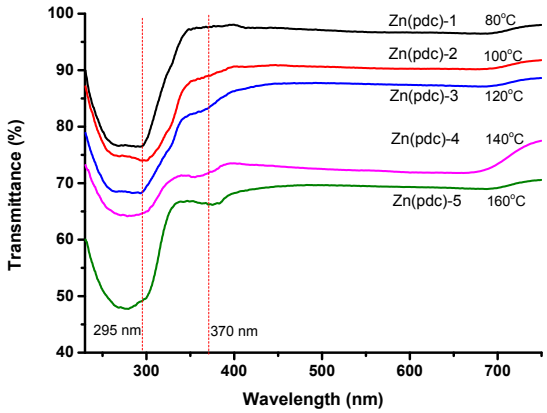

Figure S7 UV-vis DRS of Zn(pdc)-1, Zn(pdc)-2, Zn(pdc)-3, Zn(pdc)-4, Zn(pdc)-5.

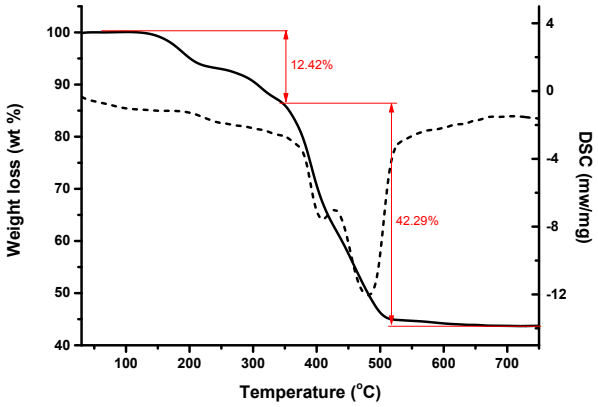

Figure S8 TGA curve (solid line) and DSC curve (dash line) for ZnO@Zn(pdc)-Euunder nitrogen.

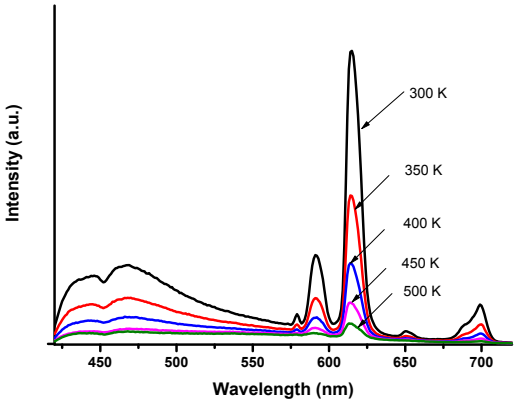

Figure S9 Temperature dependentphotoluminescence spectra of ZnO@Zn(pdc)-Eu.

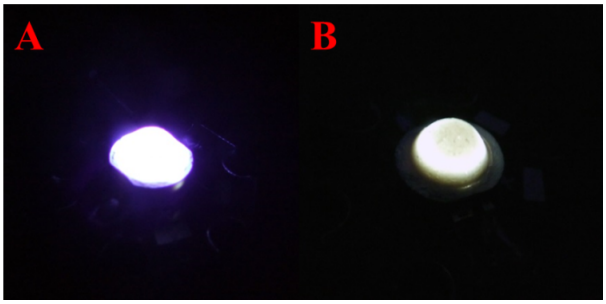

Figure S10 LED(A) emitting 395 nm light (B) emitting 365 nm light coated with a thin layer of ZnO@Zn(pdc)-Euturned on.

Table S1 ICP data of ZnO@Zn(pdc)-Ln (Ln = Eu, Tb, Sm, Dy).

Sample	C[Zn] (mg/L)	C[Ln] (mg/L) (Ln=Eu, Tb, Sm, Dy)	Atomic ratio (Ln : Zn) (Ln=Eu, Tb, Sm, Dy)
ZnO@Zn(pdc)-Eu	1.54	0.16	0.045
ZnO@Zn(pdc)-Tb	1.41	0.14	0.041
ZnO@Zn(pdc)-Sm	1.53	0.15	0.042
ZnO@Zn(pdc)-Dy	1.49	0.15	0.042

Table S2 Thetop-six XRD diffraction peaks data.

HKL	ZnO@Zn(pdc)-Eu		ZnO@Zn(pdc)-Tb		ZnO@Zn(pdc)-Sm		ZnO@Zn(pdc)-Dy	
	2θ	Crystalline (nm)	2θ	Crystalline (nm)	2θ	Crystalline (nm)	2θ	Crystalline (nm)
100	32.1	17.1	32.0	16.2	32.0	15.4	32.0	18.0
002	34.6	17.5	34.6	14.9	34.6	18.2	34.6	22.2
101	36.5	14.7	36.5	12.8	36.4	13.3	36.5	13.6
102	47.8	21.5	47.8	15.5	47.8	21.1	47.7	28.0
110	56.8	16.5	56.8	10.5	56.8	9.20	56.8	12.7

Table S3 Photoluminescent data of ZnO@Zn(pdc)-Euexcited by 365, 375, 395 nm as solid state.

Wavelength (nm)	**365**	**375**	**395**
v_{00} (cm^{-1})[a]	17271	17271	17271
v_{01} (cm^{-1})[a]	16921	16921	16921
v_{02} (cm^{-1})[a]	16313	16287	16260
v_{03} (cm^{-1})[a]	15385	15385	15385
v_{04} (cm^{-1})[a]	14306	14306	14306
I_{01}	17710	25481	43103
I_{02}	46757	72407	119784
I_{02}/I_{01}	2.64	2.84	2.78
τ (ms)	0.417	0.424	0.416
τ_{exp}^{-1} (s^{-1})	2398	2358	2404
A_{rad} (s^{-1})	236	242	238
A_{nrad} (s^{-1})	2162	2116	2166
η (%)	9.8%	10.2%	9.9%

[a]The energies of $^5D_0 \rightarrow {}^7F_J$ transition (v_{0J}), the emission intensity of the $^5D_0 \rightarrow {}^7F_1$ transition (I_{01}) and the $^5D_0 \rightarrow {}^7F_2$ transition (I_{02}), the intensity ratios between the $^5D_0 \rightarrow {}^7F_2$ and $^5D_0 \rightarrow {}^7F_1$ transition (I_{02}/I_{01}), lifetimes (τ), radiative decay rates (A_{rad}), nonradiative decay rate (A_{nrad}), and the emission quantum efficiency (η) of the Eu^{3+} excited state were obtained at room temperature.