Supplementary Information

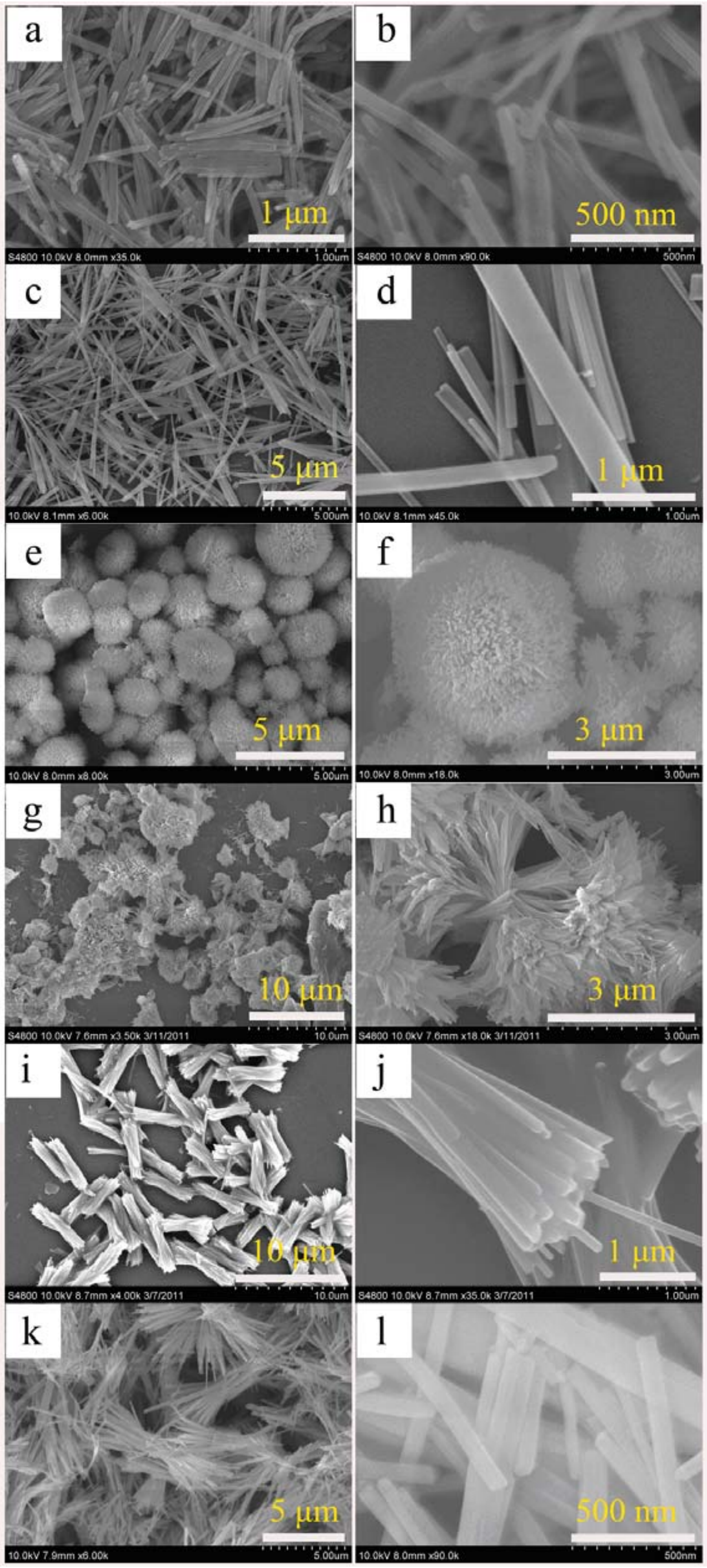

Figure S1 SEM images of the $Tb(BTC)(H_2O)_6$ with different additives at different magnifications: (a, b) nanorods (2.0 mmol sodium formate), (c, d) sheaf-like architectures (2 mmol lauric acid), (e, f) urchin-like architectures (2 mmol proline), (g, h) bowknot-like architectures (2 mmol glycine), (i, j) sheaf-like architectures (1.0 g PVP) and (k, l) straw-sheaf-like architectures (0.5 g CTAB).

According to literates, the formation of 1D nanostructures may depend on the inner and external forces.[1-5] The inner forces mainly include the growth habits of crystal and the phase structure of the sample, whereas crystal-face attraction, electrostatic and dipolar fields associated with the aggregate, van der Waals forces, hydrophilic or hydrophobic interaction, and hydrogen bonds belong to the external forces. Similar to what we proposed in early work,[6] coordination-induced self-assembling $Tb(BTC)(H_2O)_6$ molecules into one-dimensional structures represents a balance between the inner force of molecular stacking and the external force of solubility. While the addition of various additive reagents affects the external forces, as a result, different morphologies were formed.

References

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2. A. M. Morales and C. M. Lieber, *Science.* 1998, **279**, 208.

3. J. H. Warner, *Adv. Mater.* 2008, **20**, 784.

4. H. Zhang, D. Y. Wang, B. Yang and M. *J.* Helmuth, *Am. Chem. Soc.* 2006, **128**, 10171.

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6. K. Liu, H. P. You, G. Jia, Y. H. Zheng, Y. H. Song, M. Yang, Y. J. Huang and H. J. Zhang, *Cryst. Growth Des.* 2009, **9**, 3519

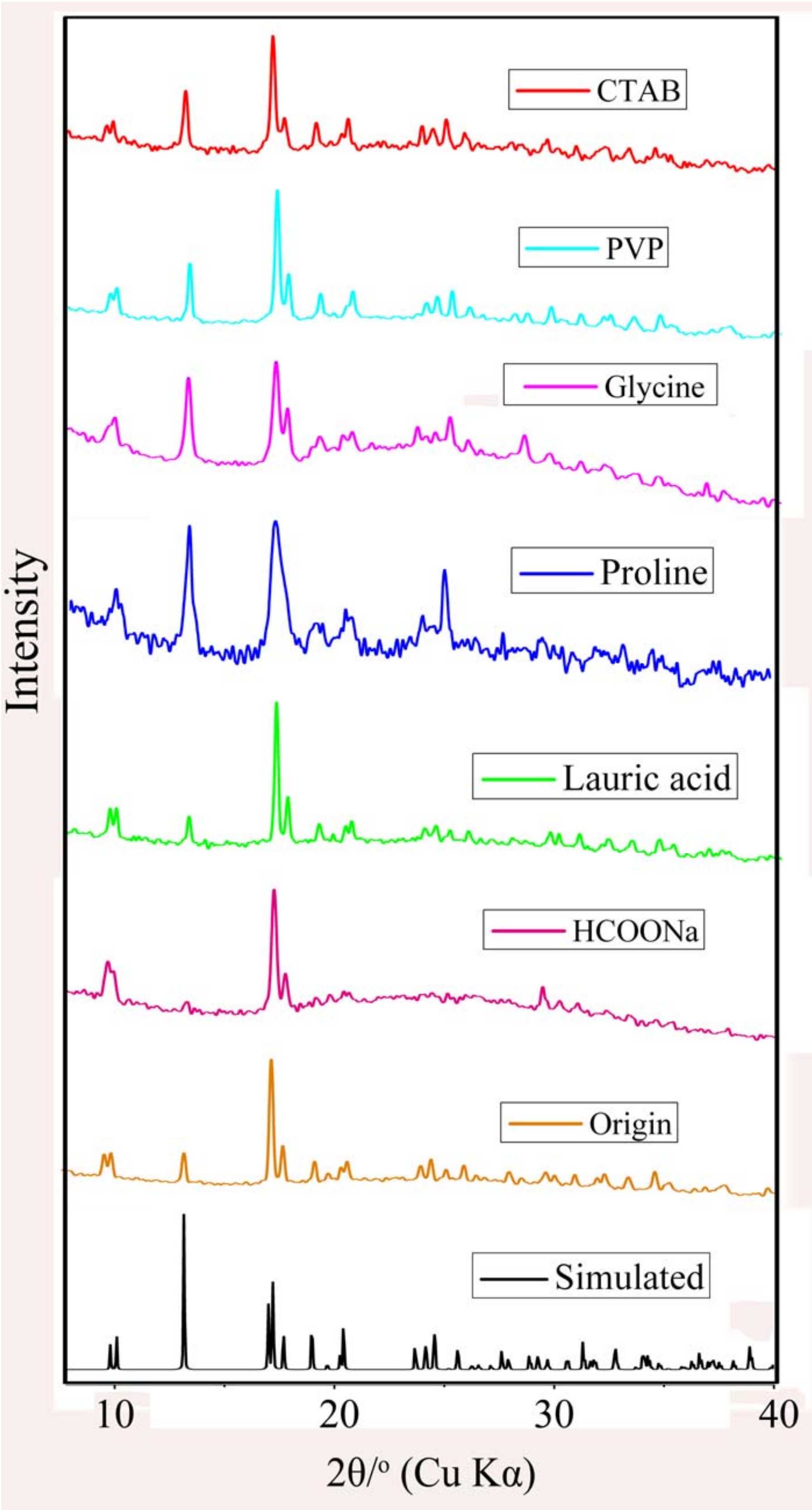

Figure S2 Simulated and experimental powder X-ray diffraction patterns of $Tb(BTC)(H_2O)_6$ with addition of different additives.

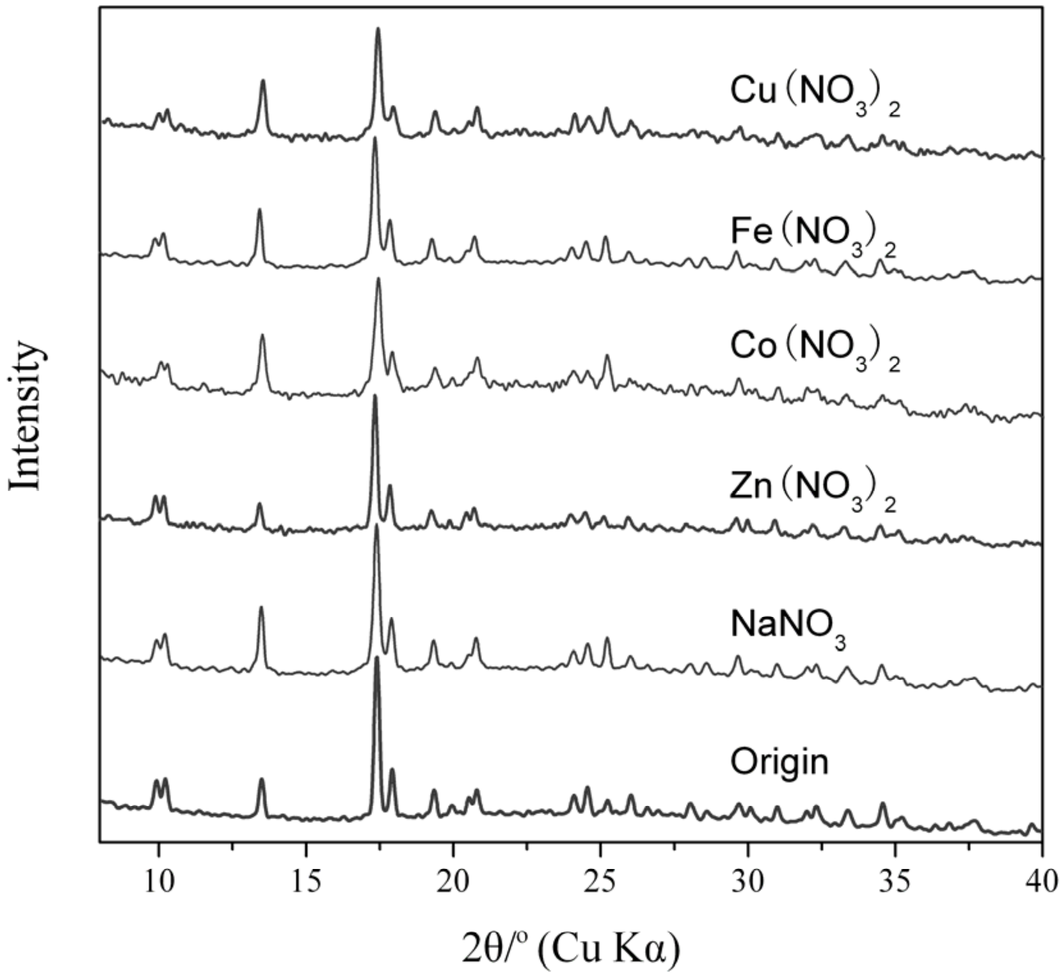

Figure S3 X-ray diffraction patterns of $Tb(BTC)(H_2O)_6$ dispersed in $Cu(NO_3)_2$, $Fe(NO_3)_2$, $Co(NO_3)_2$, $Zn(NO_3)_2$, and $NaNO_3$ aqueous solutions, and then dried at 60 °C.

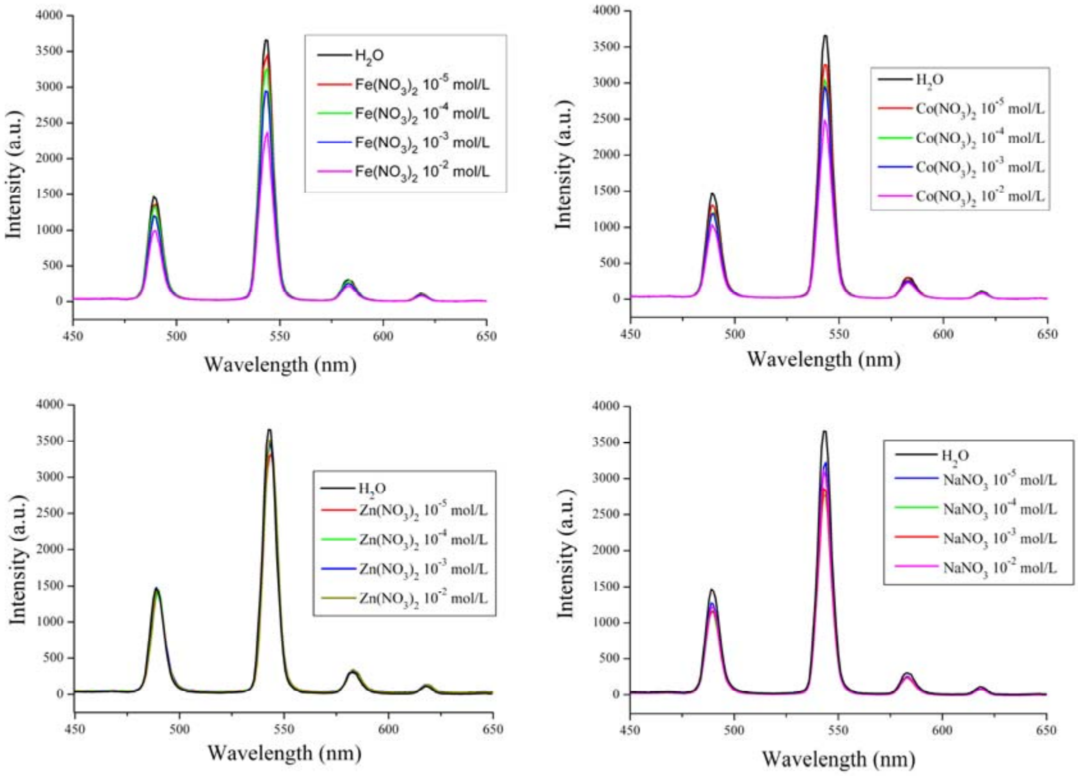

Figure S4 PL spectra of $Tb(BTC)(H_2O)_6$ in different metal ion aqueous solution at different concentration.

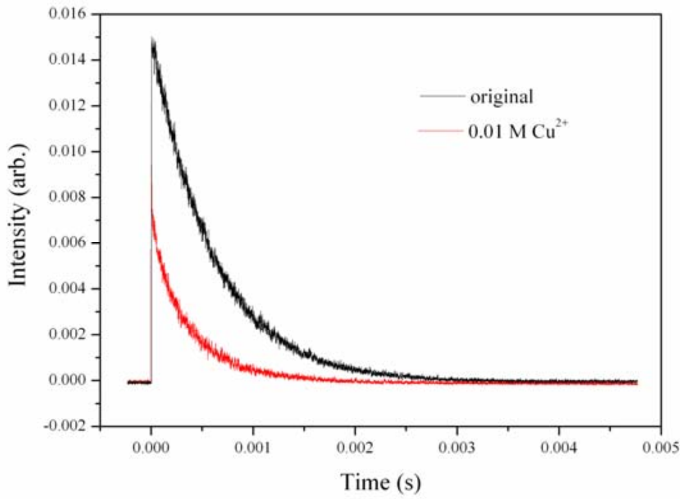

Figure S5 Comparison of the luminescence lifetime studies of Tb^{3+} in original suspension and Cu^{2+} aqueous solution.

Table S1 The luminescence lifetime studies of $Tb(BTC)(H_2O)_6$ in different solvents and metal ions solutions.

Molecules or ions	lifetime
DMF	0.73 ms
Ethanol	0.66 ms
H_2O	0.62 ms
Acetone	None
Zn^{2+}	0.64 ms
Na^{+}	0.64 ms
Fe^{2+}	0.58 ms
Co^{2+}	0.57 ms
Cu^{2+}	0.37 ms

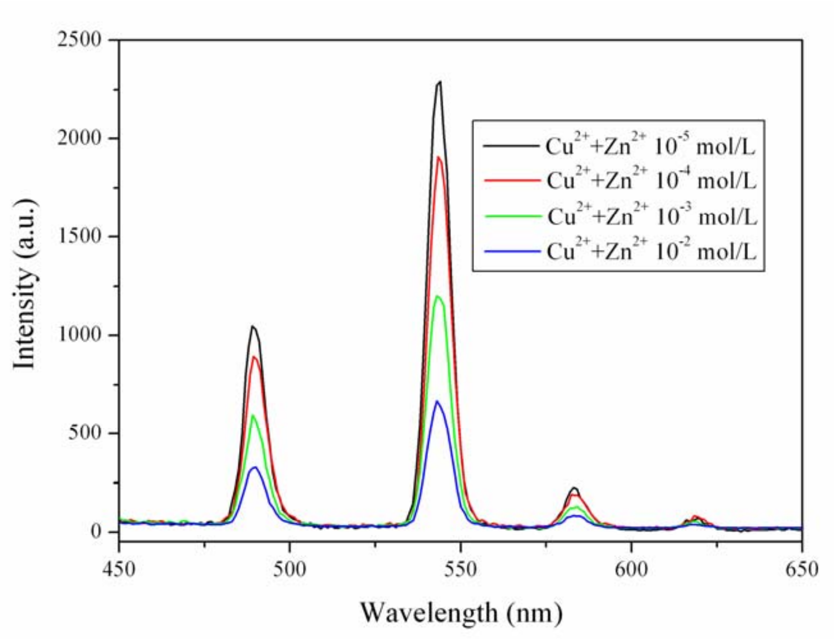

Figure S6 Emission spectra of $Tb(BTC)(H_2O)_6$ dispersed in mixture of (Cu^{2+} + Zn^{2+}) aqueous solutions (excited at 300 nm).

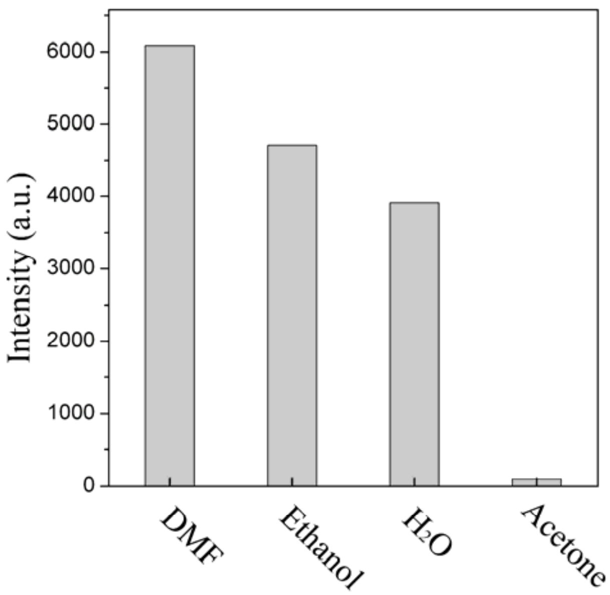

Figure S7 Comparison of the $^{5}D_{4}\rightarrow{}^{7}F_{5}$ luminescence intensity of $Tb(BTC)(H_2O)_6$ dispersed in various solvents.

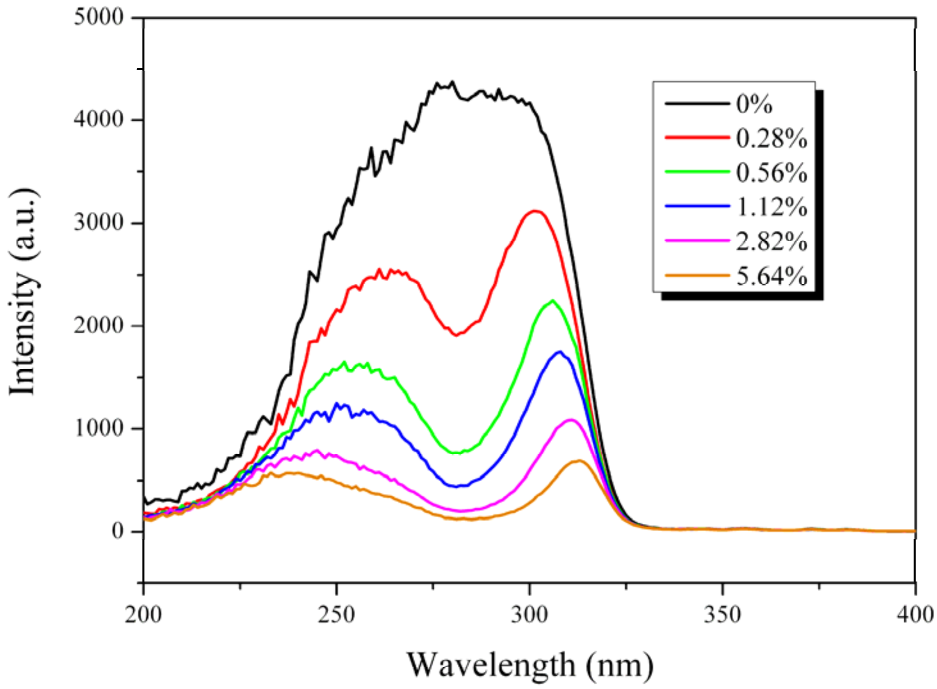

Figure S8 Excited spectra of $Tb(BTC)(H_2O)_6$ aqueous suspension in presence of various content of acetone (monitored at 544 nm).

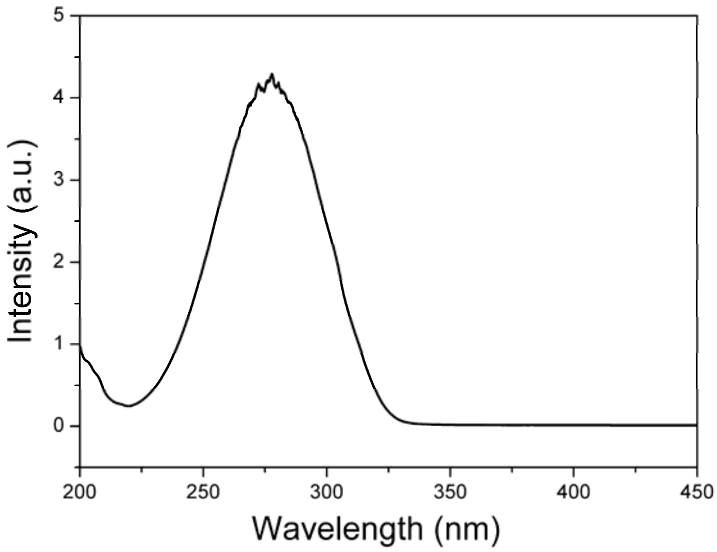

Figure S9 UV absorption spectrum of acetone in n-hexane.