Electronic Supplementary Material (ESI) for Dalton Transactions.

Supporting Information

Al-based coordination polymer nanotubes: Simple preparation, post-modification and application in Fe^{3+} ions sensing

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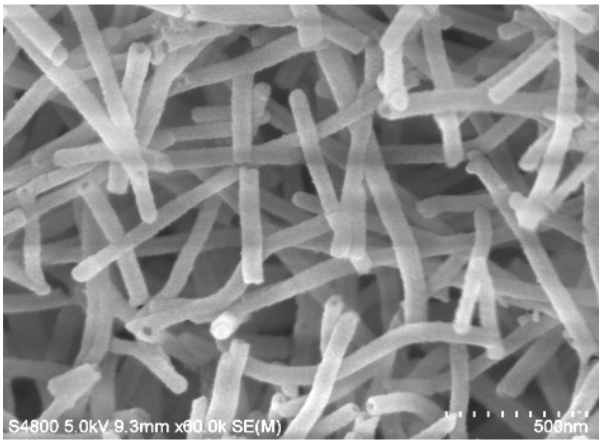

Figure S1. SEM image of MIL-110(Al) nanotubes before activation.

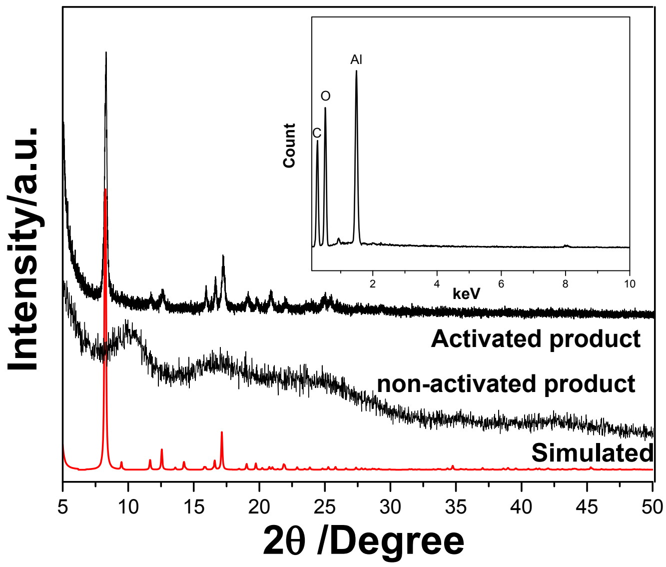

Figure S2. XRD patterns of MIL-110(Al) nanotubes before and after activation, and simulated MIL-110(Al). The inset is the EDS analysis of MIL-110(Al) nanotubes.

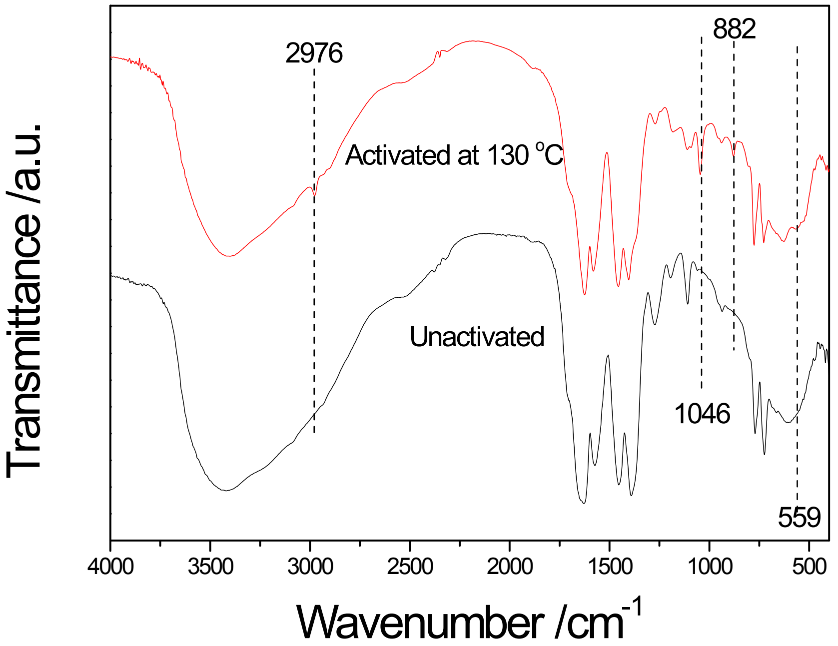

Figure S3. FT-IR spectra of the products before and after activating at 130 °C.

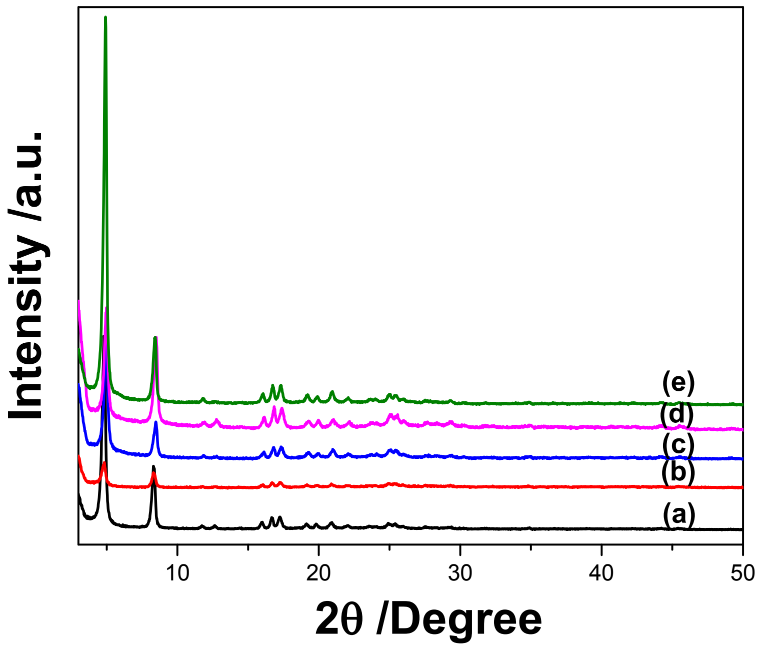

Figure S4. XRD patterns of the products obtained from various solvents: (a) pure methanol, (b) pure ethanol, (c) DMF-ethanol with the volume ratio of 10/10, (d) isopropanol-ethanol with the volume ratio of 10/10 and (e) water-ethanol with the volume ratio of 10/10.

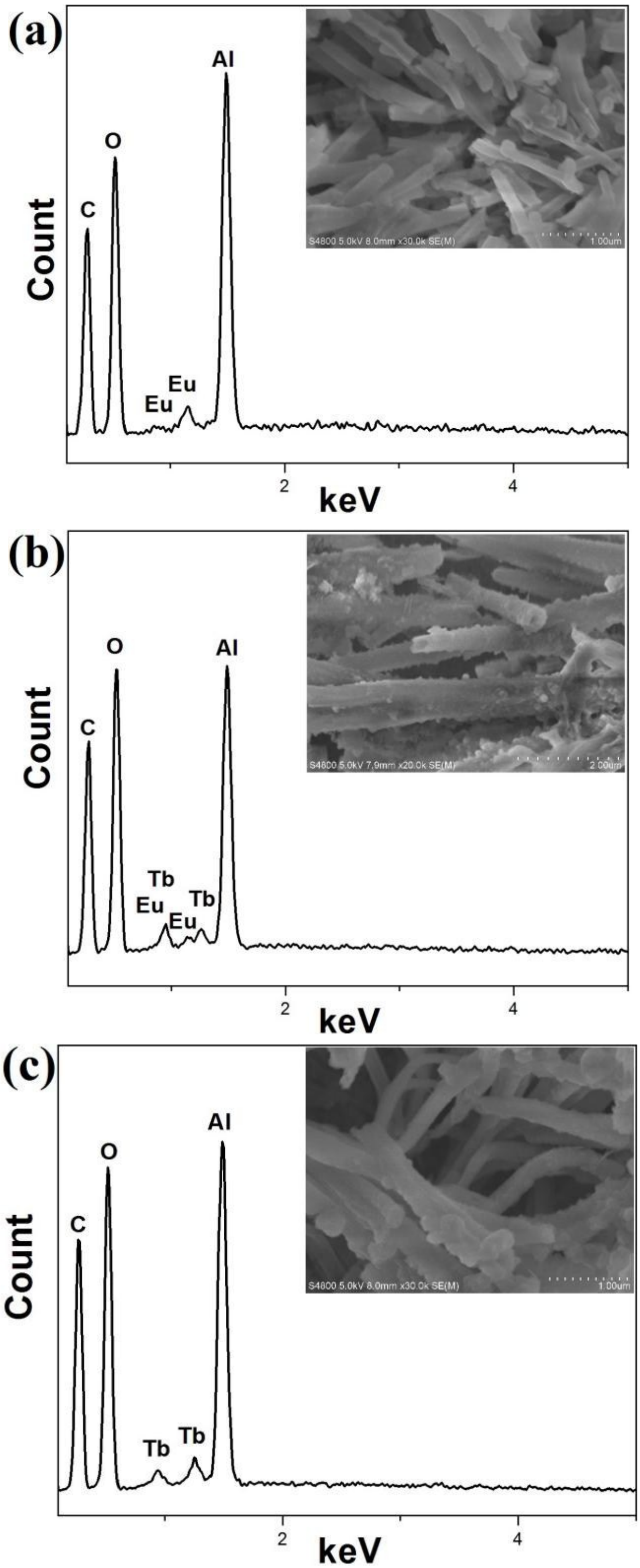

Figure S5. EDS analyses of MIL-110(Al)/Ln^{3+} and corresponding SEM images: (a) MIL-110(Al)/Eu^{3+}, (b) MIL-110(Al)/Eu^{3+}, Tb^{3+} and (c) MIL-110(Al)/Tb^{3+}.

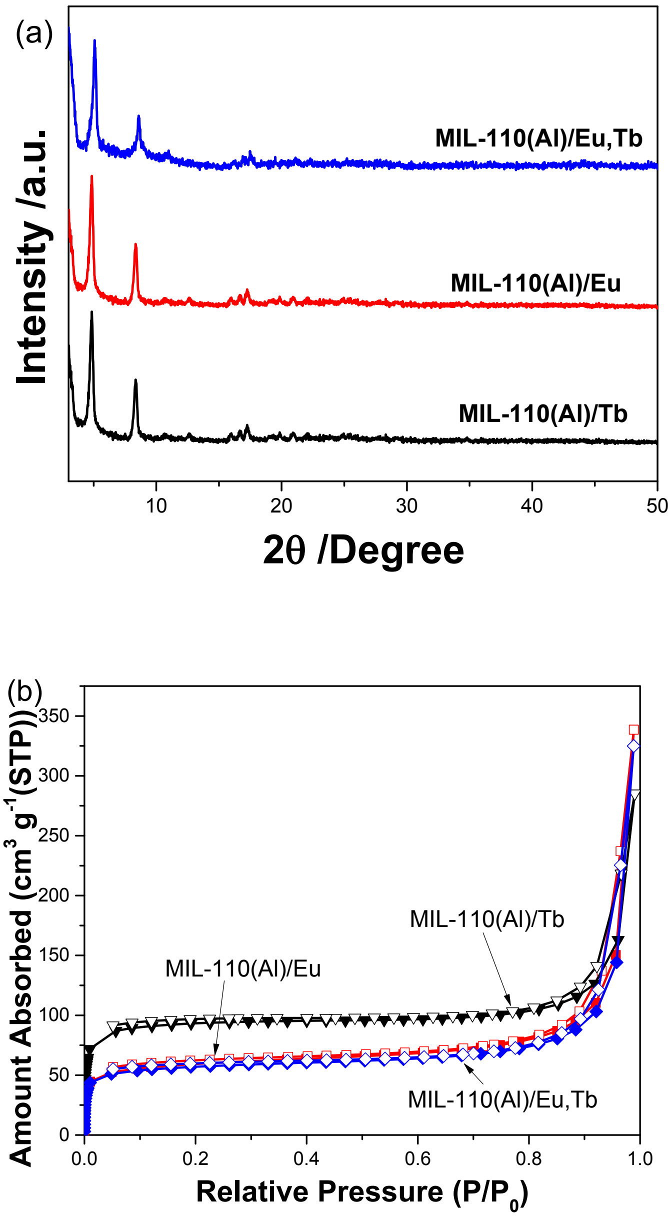

Figure S6. (a) XRD patterns and (b) N_2 adsorption-desorption isotherms (at 77 K) of the MIL-110(Al)/Ln^{3+} (Ln = Eu, Tb and Eu/Tb).

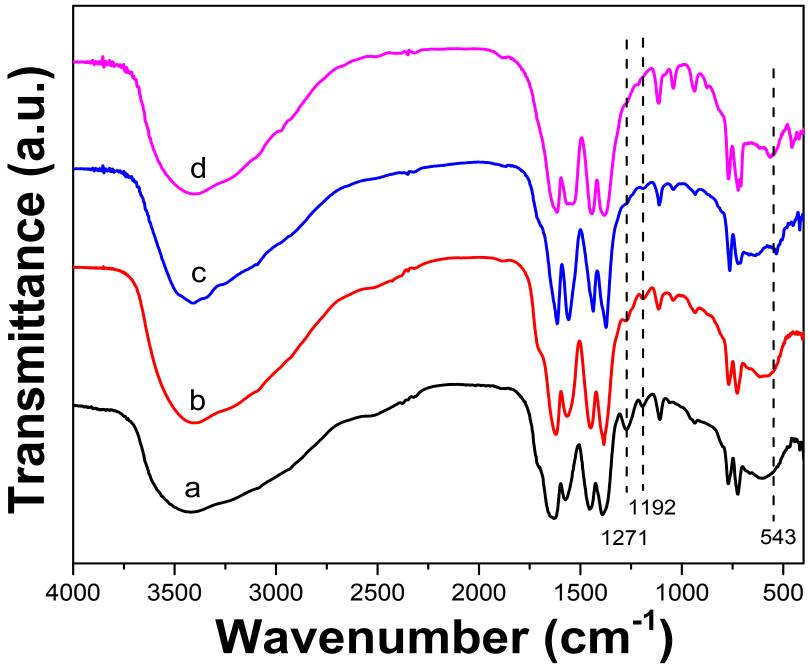

Figure S7. The FT-IR spectra of various products: (a) MIL-110(Al), (b) MIL-110(Al)/Eu^{3+}, (c) MIL-110(Al)/Tb^{3+}, and (d) MIL-110(Al)/Eu^{3+},Tb^{3+}.

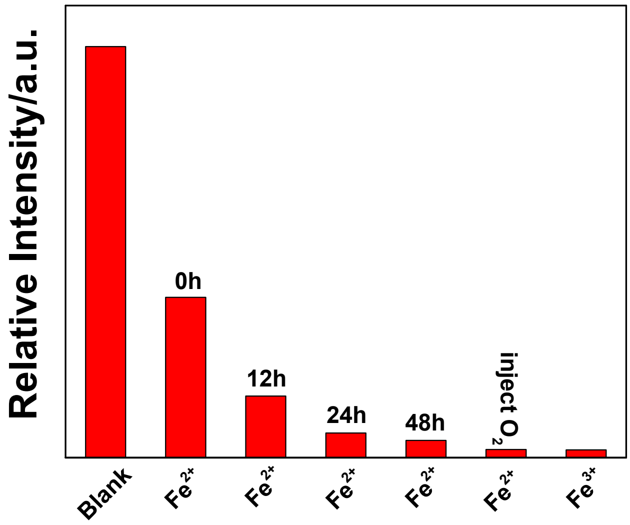

Figure S8. Luminescence intensity histograms of MIL-110(Al)/Tb^{3+} nanotubes dispersed into aqueous solutions of 2.0×10^{-2} mol·L^{-1} Fe^{2+} ions for various durations.

As shown in **Fig.S8**, under the same experimental conditions Fe^{2+} ions cannot fully quench the luminescence of MIL-110(Al)/Tb^{3+} nanotubes. With the prolonging of the time from 0 to 48 h, the luminescent intensity further reduces, but it is still higher than that after introducing Fe^{3+} ions. We believe that the decrease of the PL intensity should be ascribed to the increase of Fe^{3+} concentration in the solution due to the gradual oxidation of Fe^{2+} ions in air. Therefore, pure O_2 was injected the solution of Fe^{2+} ions after having been placed for 48 h. The result showed that the luminescence of MIL-110(Al)/Tb was quenched immediately. The above fact clearly shows that Fe^{2+} ions do not disturb the detection of Fe^{3+} ions in the current work.

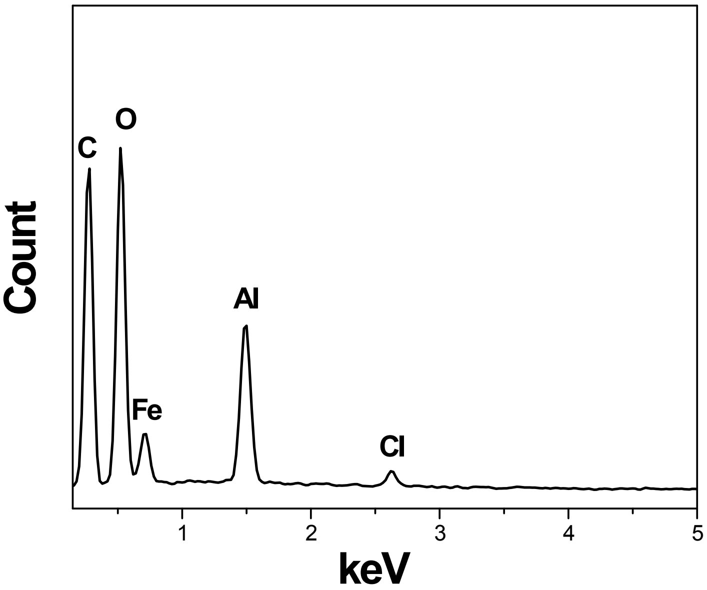

Figure S9. EDS analysis of the sample after the luminescent quenching by Fe^{3+} ions

Table S1. The contents of various metal ions in MIL-110(Al)/Ln^{3+} (Ln = Tb^{3+}, Eu^{3+}, Eu^{3+}/Tb^{3+}) analyzed by the ICP technology**.**

Sample	Al(ppm)	Tb(ppm)	Eu(ppm)	Al/Ln molar ratio
MIL-110(Al)/Tb^{3+}	40.84	17.79	/	13.5/1
MIL-110(Al)/Eu^{3+}	41.73	/	6.75	34.8/1
MIL-110(Al)/Eu^{3+},Tb^{3+}	39.83	5.08	3.51	63.9/1.4/1

Table S2. The contents of various metal ions in MIL-110(Al) samples after exposure to target metal ions (K^+ or Fe^{3+}) obtained by the ICP technology

Sample	Al(ppm)	Tb(ppm)	M^{n+} (ppm)	Al:Tb:M^{n+} molar ratio
MIL-110(Al)/Tb^{3+}/K^+	41.22	17.79	4.93	13.51:1:1.125
MIL-110(Al)/Tb^{3+}/Fe^{3+}	34.58	0.18	22.50	1131:1:361