Electronic Supplementary Material (ESI) for Dalton Transactions.


# Supporting information

## A novel covalently post-synthetic modified MOF hybrid as sensitive and selective fluorescent probe for $Al^{3+}$ detection in aqueous media

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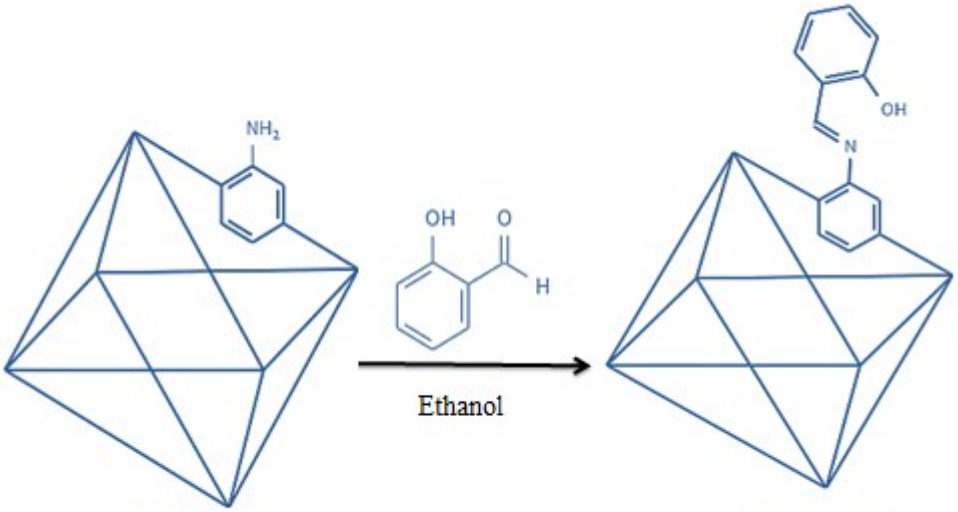


UiO-66-$NH_2$ UiO-66-$NH_2$-SA

**Scheme S1** Synthetic route of UiO-66-$NH_2$-SA via a covalent PSM method based on Schiff base reaction.

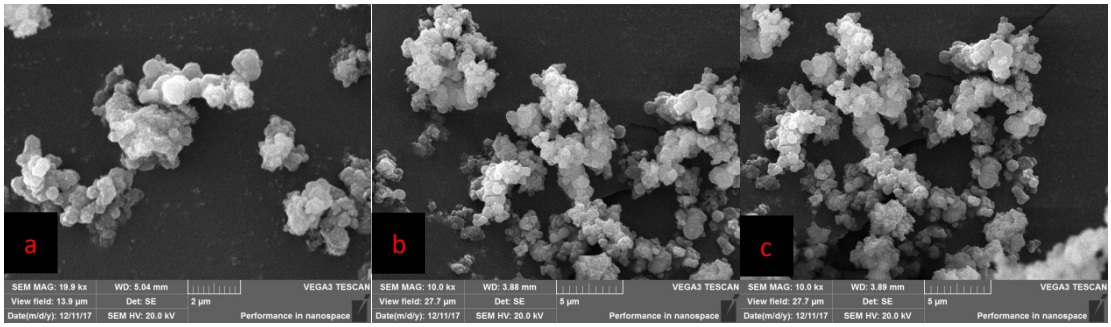


**Fig. S1** SEM images of the as-prepared UiO-66-$NH_2$ (a), UiO-66-$NH_2$-SA (b), $Al^{3+}$@UiO-66-$NH_2$-SA (c).

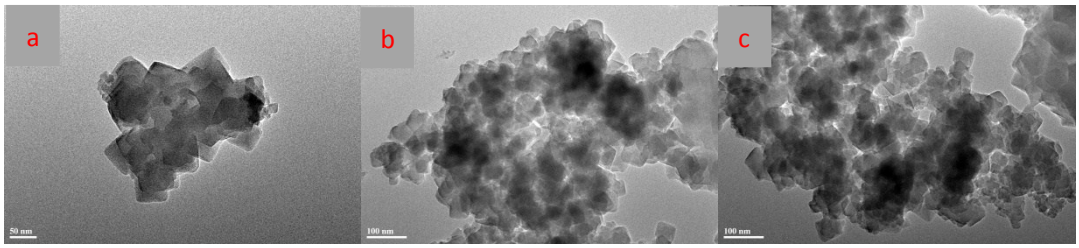


**Fig. S2** TEM images of the as-prepared UiO-66-$NH_2$ (a), UiO-66-$NH_2$-SA (b), $Al^{3+}$@UiO-66-$NH_2$-SA (c).

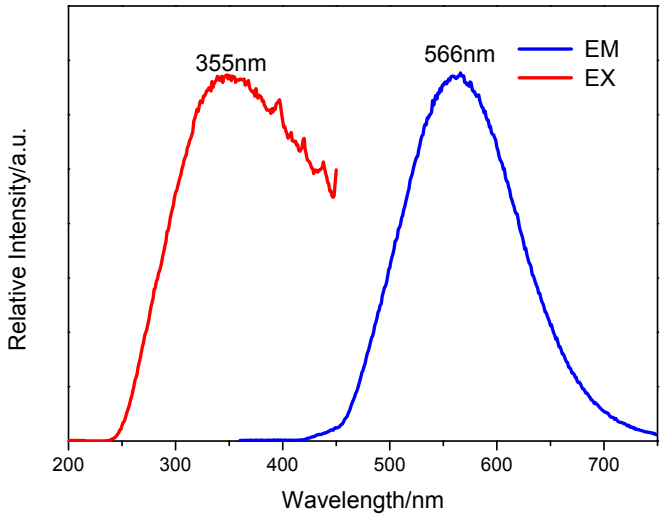


**Fig. S3** Room temperature excitation and emission spectra of free ligand $NH_2$-BDC in solid state.

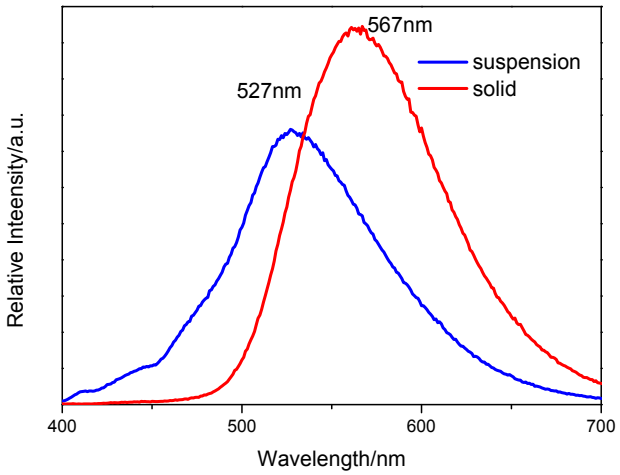


**Fig. S4** Emission spectra of UiO-66-$NH_2$-SA in solid and suspension state.

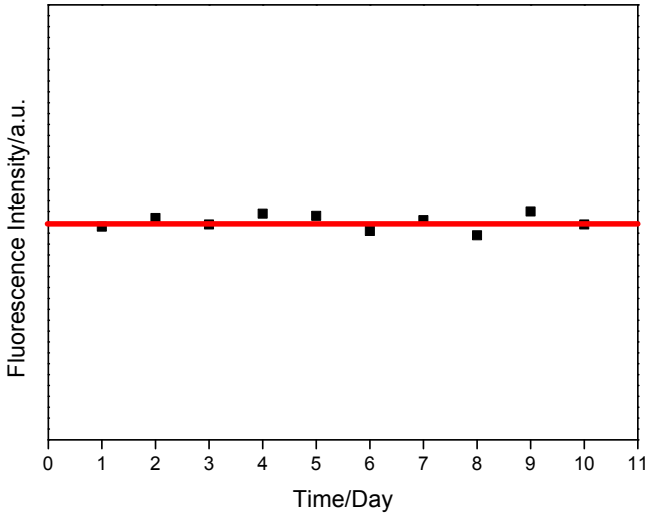


**Fig. S5** Day-to-day fluorescence stability of UiO-66-$NH_2$-SA in aqueous solution.

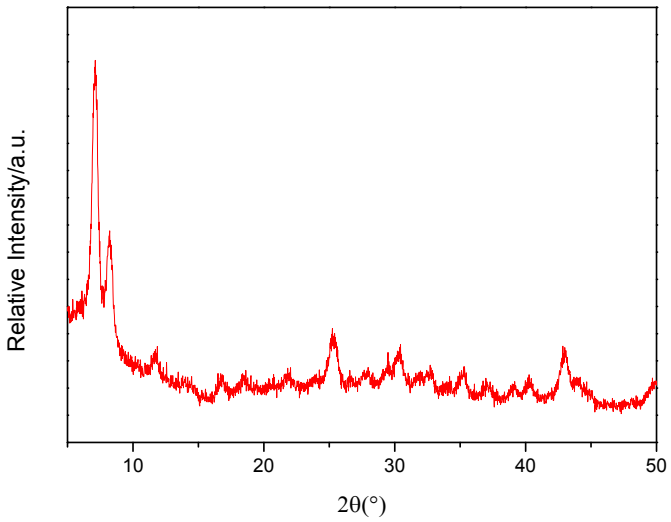


**Fig. S6** PXRD pattern of UiO-66-$NH_2$-SA after dispersed in water.

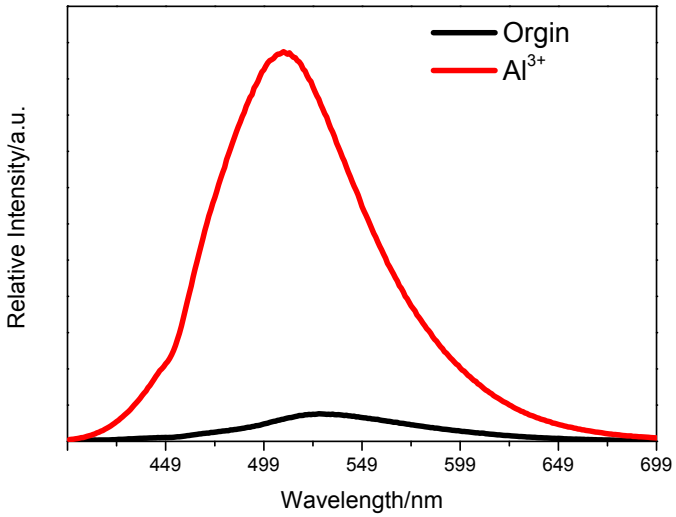


**Fig. S7** Suspension-state PL spectra of UiO-66-$NH_2$-SA and $Al^{3+}$@UiO-66-$NH_2$-SA when excited at 360 nm.

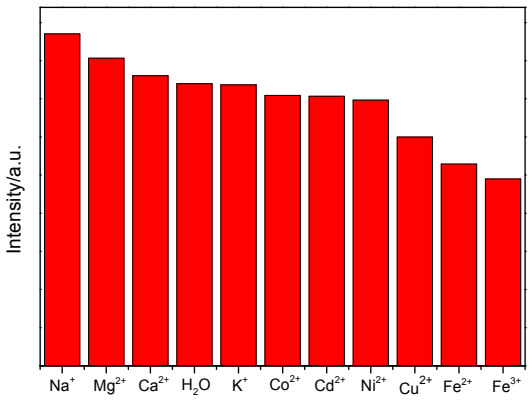


**Fig. S8** Luminescence intensity of $Al^{3+}$@UiO-66-$NH_2$-SA upon the addition of other ions.

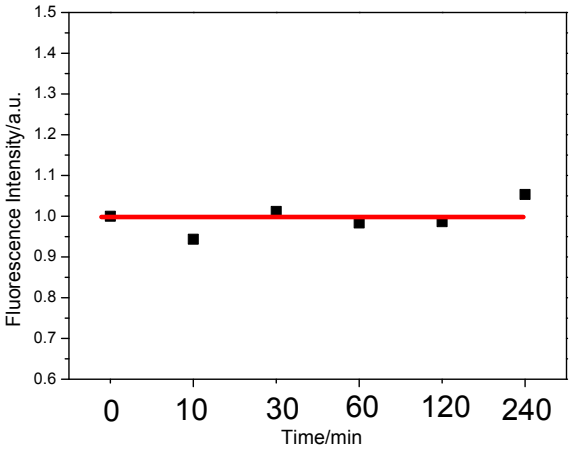


**Fig. S9** Fluorescence intensity of UiO-66-$NH_2$-SA when treated with $Al^{3+}$ solution for different time

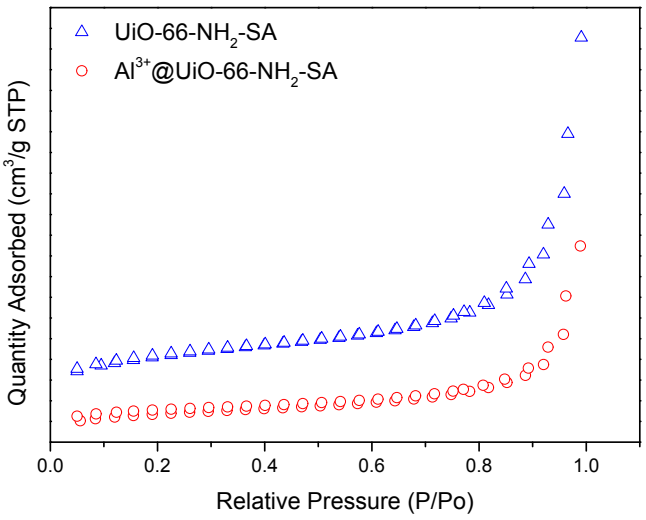


**Fig. S10** N2 adsorption−desorption isotherms of UiO-66-$NH_2$-SA and $Al^{3+}$@ UiO-66-$NH_2$-SA

**Table S1** Response of luminescence lifetime of UiO-66-$NH_2$-SA towards aqueous solutions of various metal cations.

| Metal ions | τ/(μs) |
|---|---|
| $Al^{3+}$ | 467.56 |
| $K^+$ | 35.44 |
| $Cd^{2+}$ | 15.78 |
| $Mg^{2+}$ | 14.71 |
| $Ni^{2+}$ | 13.72 |
| $Ca^{2+}$ | 13.19 |
| $Co^{2+}$ | 12.54 |
| $Na^+$ | 11.88 |
| $Cu^{2+}$ | 10.60 |
| $Fe^{2+}$ | 9.69 |
| $H_2O$ | 8.93 |
| $Fe^{3+}$ | 6.20 |