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Supplementary Material

Water Soluble Perylene Diimide for Highly Sensitive and Reusable Metal Ions Detection with Novel Logic Gate Operation

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Figure S1. ^{1}H NMR spectra of PASP molecule.

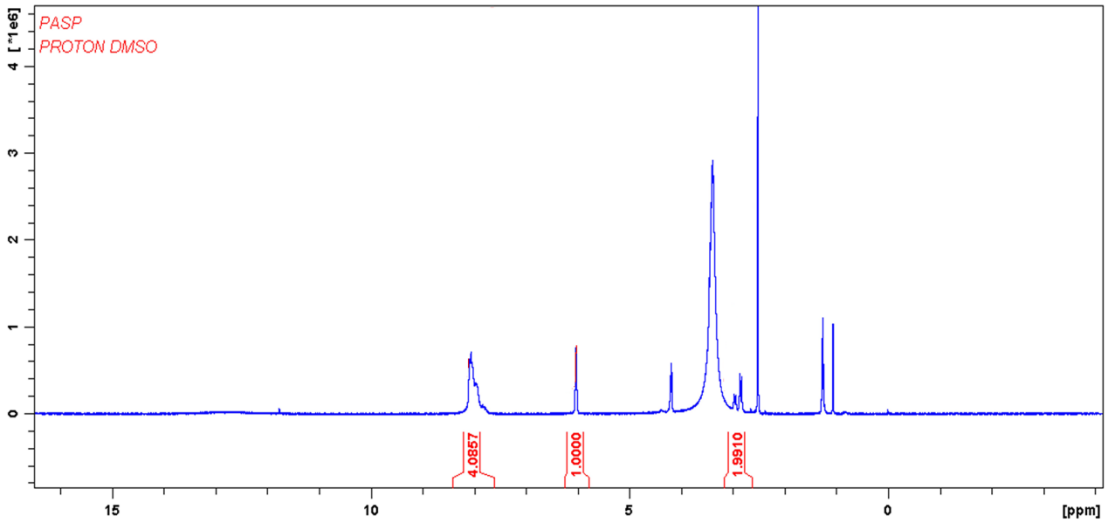

Figure S2. Linear relationship between the Fluorescence intensity of the PASP at 550nm and logarithm of metal ion (Cu^{2+} and Al^{3+}) concentrations.

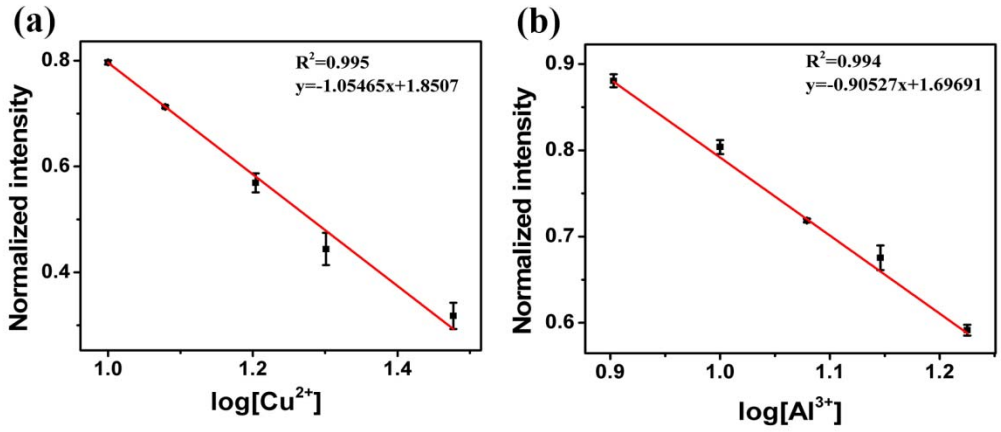

Figure S3. The PASP-Cu fluorescence reversibility after addition of $P_2O_7^{4-}$ ions in HEPES buffer solution (50 mM, pH 7.2)

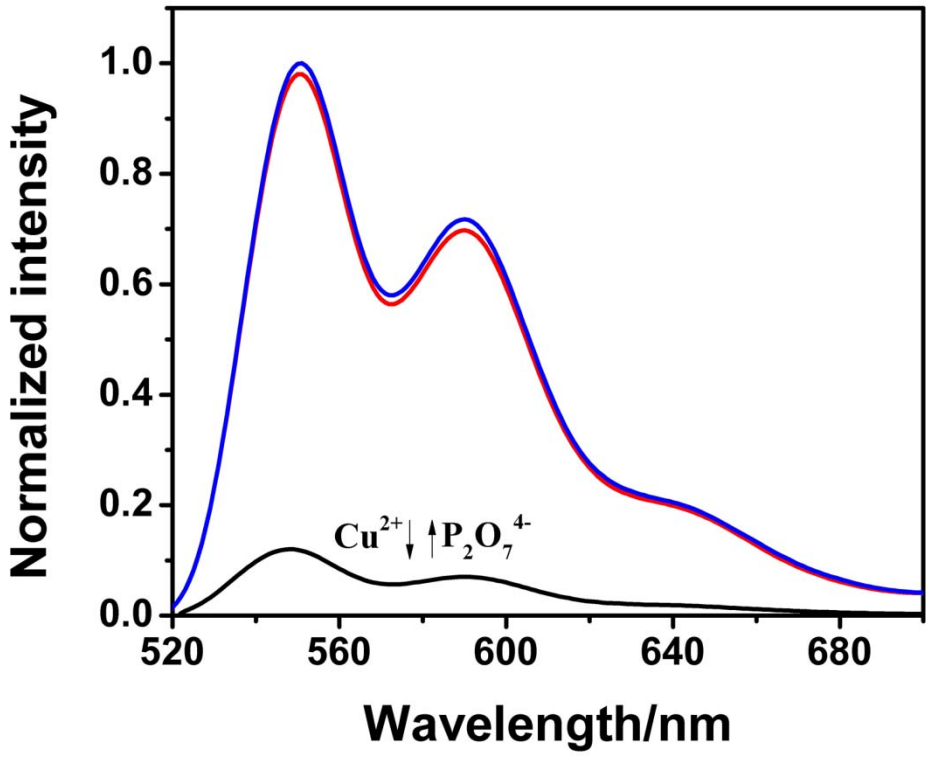

Figure S4. The PASP fluorescence with (a) EDTA or (b) $P_2O_7^{4-}$ ions addition in HEPES buffer solution (50 mM, pH 7.2)

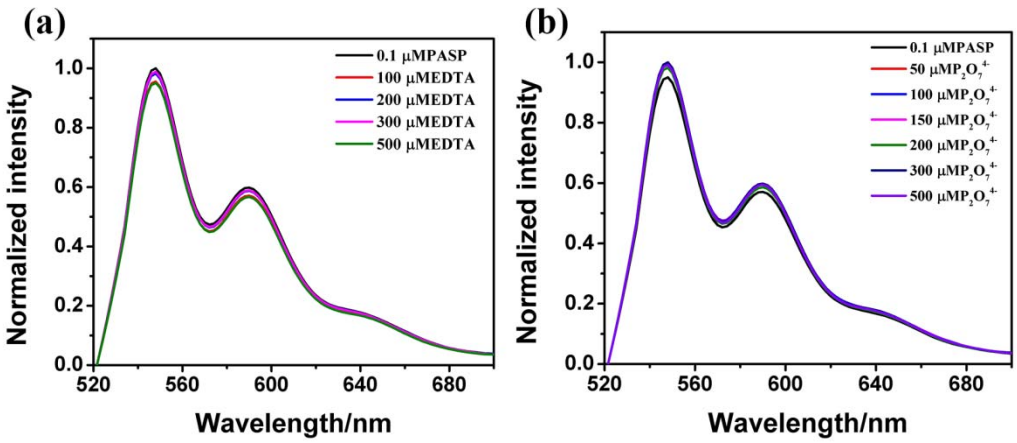

Figure S5. (a) UV–Vis absorption spectra of PASP-Cu (10 μM) in the presence of EDTA and (b) The PASP-Al fluorescence reversibility with EDTA in HEPES buffer solution (50 mM, pH 7.2).

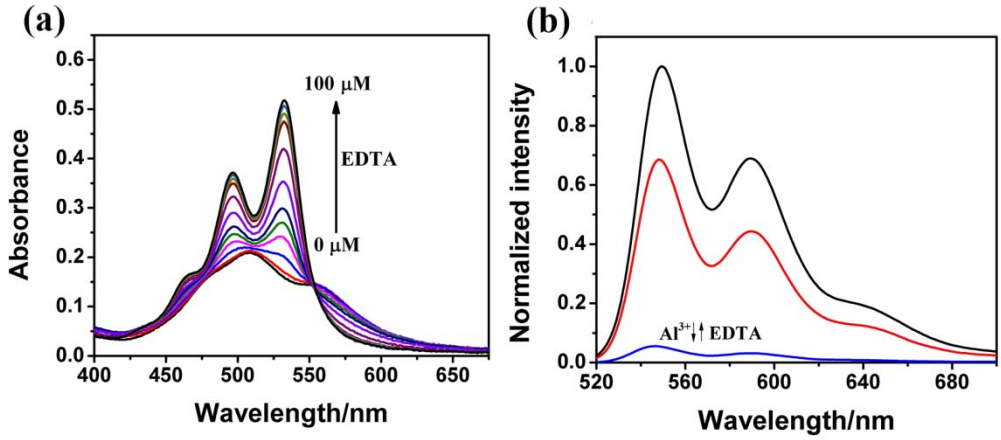

Figure S6. UV–Vis absorption spectra of PASP for Cu^{2+} and Al^{3+} responses (from 0 to 400 μM) in 10% diluted serum.

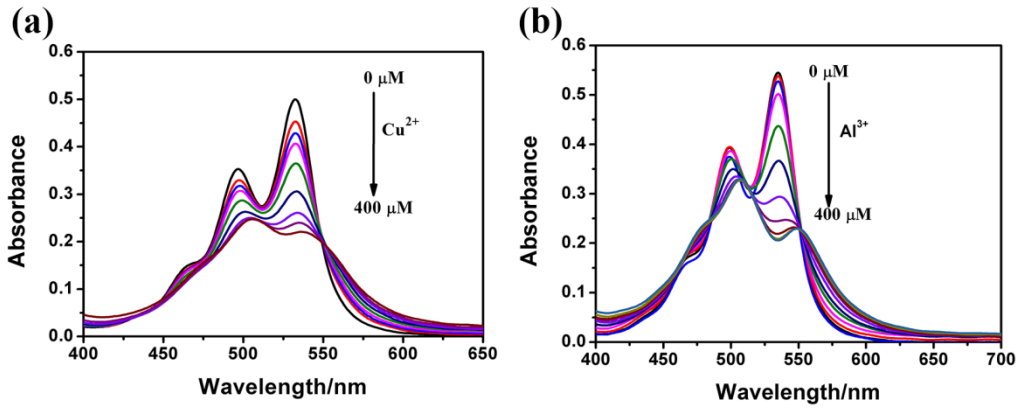

Figure S7. General structure of PDIs.

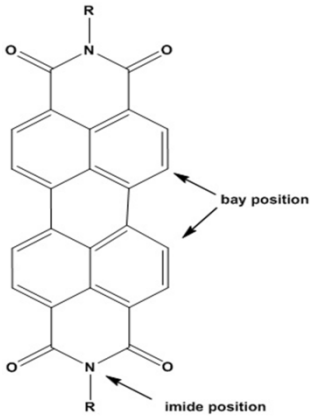

Table S1. Comparison of the present work with other reported Cu^{2+} sensors

Materials Used	Detection limit / μM	Measure-ment range /μM	Response In complicated serum	Recycle or not	Ref
Gold nanoparticles	10	0-500	no	no	[1]
ZnS quantum dots	7.1	0-360	no	no	[2]
Kryptofix 22	0.017	0.03-2.34	no	no	[3]
Oxamide ligand	0.097	0.9-31	no	no	[4]
Schiff bases	1	0-1000	no	no	[5]
Coumarin group	6	0-60	yes	no	[6]
CdTe nanoparticles	1.8	0-2000	no	no	[7]
Perylene diimide	0.22	0-100	yes	yes	Present work

Table S2. Comparison of the present work with other reported Al^{3+} sensors

Materials Used	Detection limit / μM	Measure-ment range /μM	Response In complicated serum	Recycle or not	Ref
citrate capped gold nanoparticles	1	1-100	no	no	[8]
morin	0.32	$1\text{-}10^6$	no	no	[9]
pyrimidine–pyrene scaffold	0.24	10-130	yes	no	[10]
pyridyl-salicylimine	1.69	0-60	no	no	[11]
rhodamine 6G	3.26	0-50	yes	no	[12]
Schiff base-type fluorescent chemosensor	0.17	0-20	yes	no	[13]
Perylene diimide	0.24	0-100	yes	yes	Present work

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