

## Electronic Supplementary Information

### **Facile synthesis of one Ag(I)-doped coordination polymer with enhanced catalytic performance in the photodegradation of azo dyes in water**

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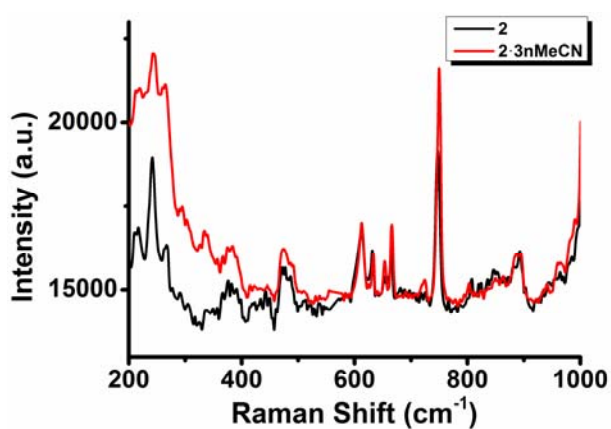
**Table S1.** Summary of crystallographic data for 2·3nMeCN.

Compound	2·3nMeCN
Empirical Formula	C <sub>66</sub> H <sub>81</sub> F <sub>24</sub> N <sub>11</sub> P <sub>4</sub> Pb <sub>2</sub> S <sub>4</sub>
Formula Weight	2150.92
Crystal System	monoclinic
Space Group	<i>C2/c</i>
<i>a</i> (Å)	29.1107(14)
<i>b</i> (Å)	10.0415(5)
<i>c</i> (Å)	31.3043(14)
$\beta$ (°)	105.3360(10)
<i>V</i> (Å <sup>3</sup> )	8823.6(7)
<i>Z</i>	4
$\rho_{\text{calc}}$ (g cm <sup>-3</sup> )	1.619
F(000)	4232
$\mu$ (MoK $\alpha$ , mm <sup>-1</sup> )	4.072
Total reflections	89835
Unique reflection	8066 ( $R_{\text{int}} = 0.0342$ )
No. Observations	6809 ( $I > 2.00\sigma(I)$ )
No. Parameters	523
$R^a$	0.0387
$R_w^b$	0.1063
$GOF^c$	1.125

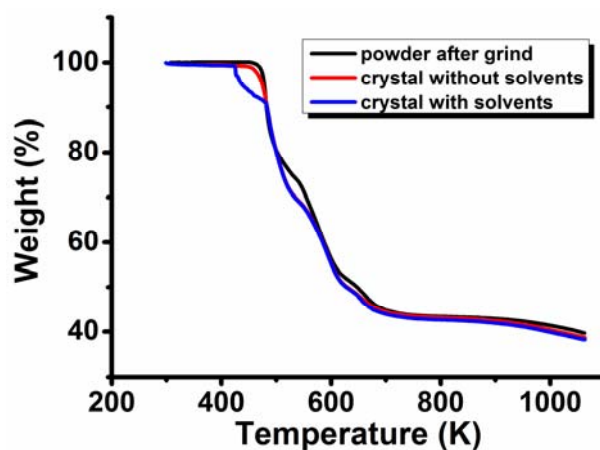
<sup>a)</sup>  $R = \Sigma||F_o| - |F_c|| / \Sigma|F_o|$ ; <sup>b)</sup>  $R_w = [\Sigma w(F_o^2 - F_c^2)^2 / \Sigma w(F_o^2)^2]^{1/2}$ ; <sup>c)</sup>  $GOF = \{\Sigma w[(F_o^2 - F_c^2)^2] / (n-p)\}^{1/2}$ .

**Table S2.** Selected bond lengths (Å) and angles (°) for 2·3nMeCN.

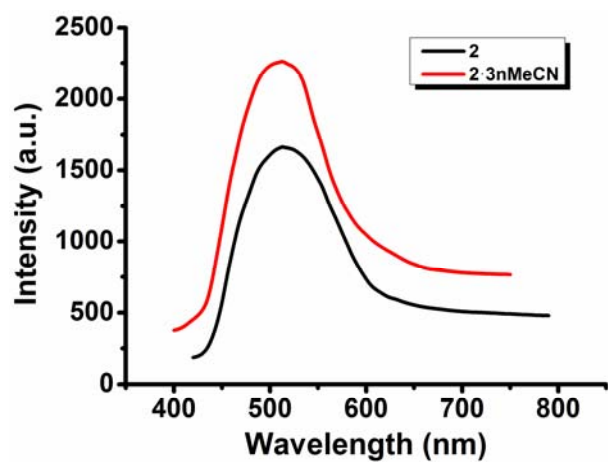
Compound 2·3nMeCN			
Pb(1)-S(1)	2.6743 (16)	Pb(1)-S(2)	2.6287(17)
Pb(1)-N(3)	2.636(5)	Pb(1)-N(4)	2.622(5)
S(1)-Pb(1)-N(3)	89.62(14)	S(1)-Pb(1)-N(4)	84.70(13)
S(2)-Pb(1)-N(3)	89.21(13)	S(2)-Pb(1)-N(4)	78.09(13)
S(1)-Pb(1)-S(2)	89.72(6)	N(3)-Pb(1)-N(4)	166.1(2)



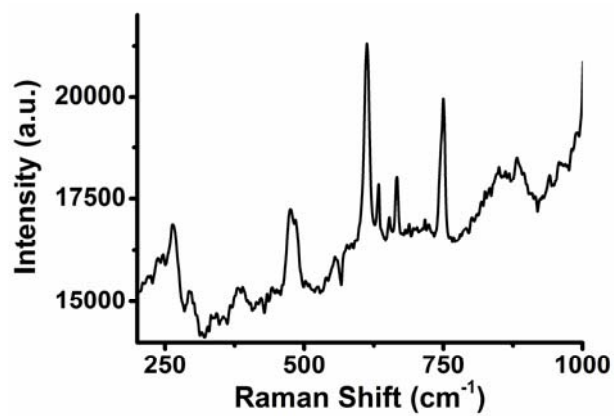
**Fig. S1** The Raman spectra of 2 and 2·3nMeCN.



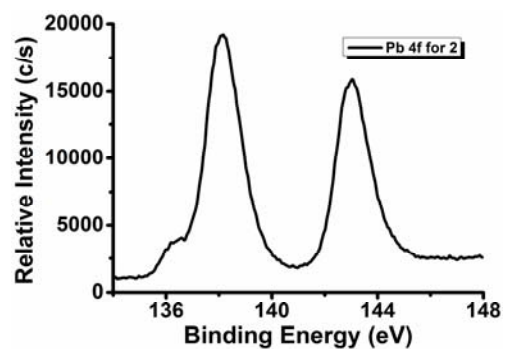
**Fig. S2** The TGA curves for 2.



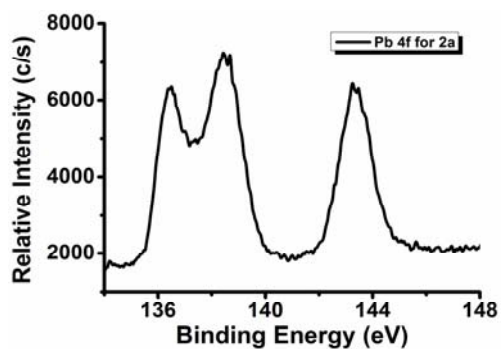
**Fig. S3** The solid state emission spectra of **2** and **2·3nMeCN** (excitation at 400 nm).



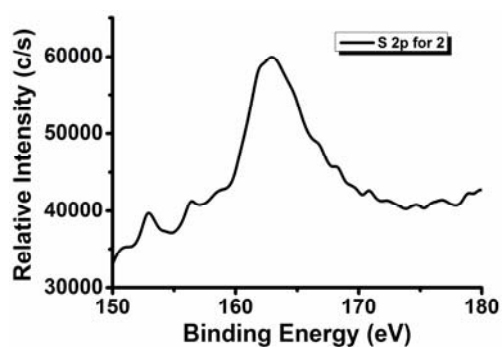
**Fig. S4** The Raman spectrum of **2a**.



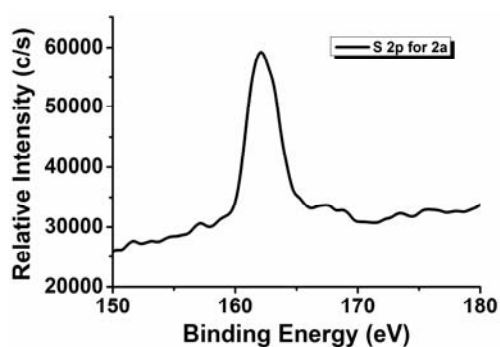
(a)



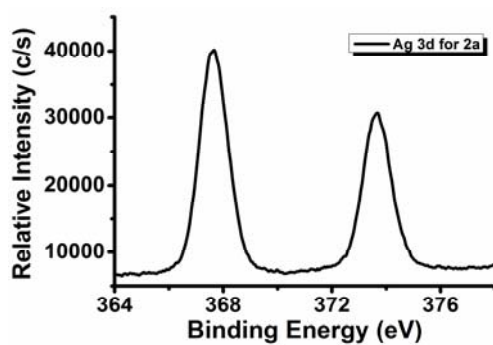
(b)



(c)

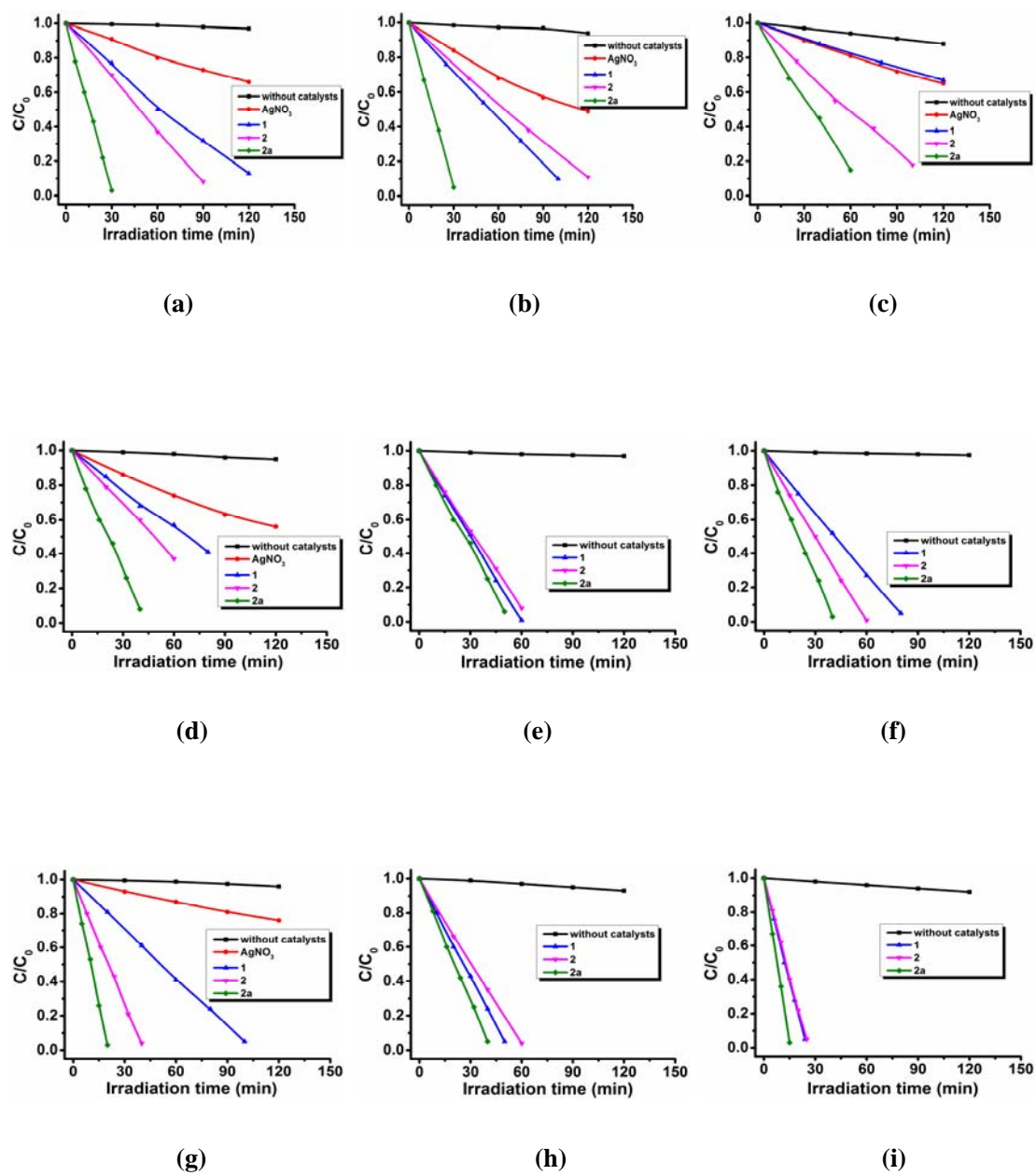


(d)

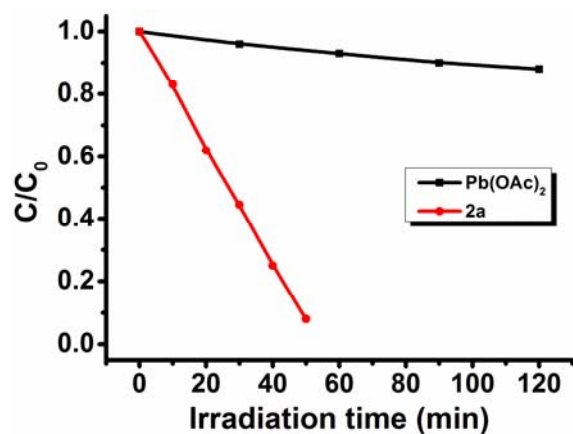


(e)

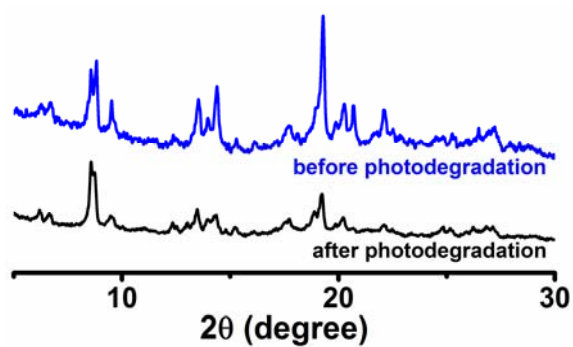
**Fig. S5** The XPS spectra for two samples. (a) The Pb 4f core level spectrum for **2**; (b) The Pb 4f core level spectrum for **2a**; (c) The S 2p core level spectrum for **2**; (d) The S 2p core level spectrum for **2a**; (e) The Ag 3d core level spectrum for **2a**.



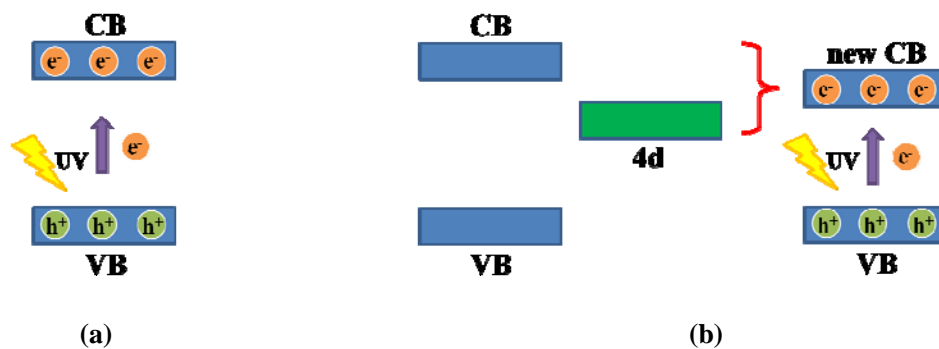
**Fig. S6** Comparison of catalytic activity of the different catalysts (**1**, **2** and **2a**) in photodegradation of acid orange 7 (a), orange I (b), orange IV (c), orange G (d), acid red 27 (e), sunset yellow (f), nigrosin (g), acid chrome blue K (h) and eriochrome black T (i) under UV light irradiation.



**Fig. S7** Comparison of catalytic activity of **2a** and Pb(OAc)<sub>2</sub> in photodegradation of MO under UV light irradiation.

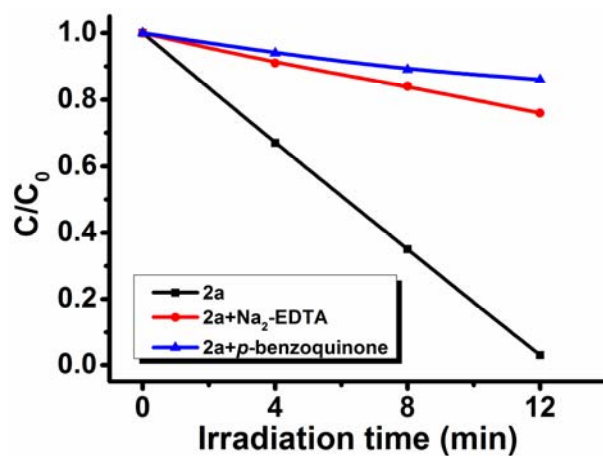


**Fig. S8** The PXRD patterns of **2a** before and after photodegradation.



**Fig. S9** Mechanism of the catalytic photodegradation by compound **2** (a) and **2a** (b) under UV light irradiation.





**Fig. S10** The effect of addition of quenchers on the catalytic activity of **2a** under UV light irradiation in amido black 10B photodegradation.