## **Supporting Information**

## Highly Monodisperse Cu<sub>3</sub>Mo<sub>2</sub>O<sub>9</sub> Micropompons with Excellent Performance in Photocatalysis, Photocurrent Response and Lithium Storage

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**Figure S1.** The XRD patterns of NiMoO<sub>4</sub> xH<sub>2</sub>O (a), Cu<sub>3</sub>(OH)<sub>2</sub>(MoO<sub>4</sub>)<sub>2</sub> (b) and Zn<sub>3</sub>(OH)<sub>2</sub>(MoO<sub>4</sub>)<sub>2</sub> (c).



**Figure S2.** FE-SEM image of NiMoO<sub>4</sub> *x*H<sub>2</sub>O.



Figure S3. FE-SEM images of  $Cu_3(OH)_2(MoO_4)_2$  (a) and  $Zn_3(OH)_2(MoO_4)_2$  (b).







**Figure S5.** XRD patterns of NiMoO<sub>4</sub> xH<sub>2</sub>O (a) and Cu<sub>3</sub>(OH)<sub>2</sub>(MoO<sub>4</sub>)<sub>2</sub> (c) obtained at 383 K for heating time of 10 h with a 2:1 initial molar ratio of Mo to Ni and Mo to Cu;  $\alpha$ -NiMoO<sub>4</sub> (b) and Cu<sub>3</sub>Mo<sub>2</sub>O<sub>9</sub> (d) were their sintering products at 873 K for 3 h.



Figure S6. FE-SEM image of ZnMoO<sub>4</sub> 0.8H<sub>2</sub>O.



**Figure S7.**The evolution of the precursor  $Cu_3(OH)_2(MoO_4)_2$  performed at 383 K for heating times of 0.5, 1, 3, 5 and 10 h.



**Figure S8.** XRD pattern of the  $(NH_4)_2Cu(MoO_4)_2$  obtained by changing water to anhydrous ethanol at 383 K for heating time of 10 h.



**Figure S9.** FE-SEM image of the  $(NH_4)_2Cu(MoO_4)_2$  obtained by changing water to anhydrous ethanol at 383 K for heating time of 10 h.



**Figure S10.** XRD patterns of the  $Cu_3(OH)_2(MoO_4)_2$  materials obtained at 383 K for heating time of 0.5 h in the presence of HCl (a), HAc (b) and H<sub>4</sub>Y (c).



**Figure S11.** FE-SEM images of the  $Cu_3(OH)_2(MoO_4)_2$  materials obtained at 383 K for heating time of 10 h in the presence of HCl (a) and HAc (b).



Figure S12. XRD patterns of the  $Cu_3(OH)_2(MoO_4)_2$  microurchins (a) and  $Cu_3Mo_2O_9$  micropompons (b).



**Figure S13.** XRD patterns of the spherical  $Cu_3(OH)_2(MoO_4)_2$  material prepared at 383 K for 10 h in the presence of 0.10 (a) and 0.30 g (b) H<sub>4</sub>Y.



**Figure S14.** FE-SEM images of the spherical  $Cu_3(OH)_2(MoO_4)_2$  material prepared at 383 K for 10 h in the presence of 0.10 (a) and 0.30 g (b) H<sub>4</sub>Y.



**Figure S15.** FE-SEM images of the  $(NH_4)_2Cu(MoO_4)_2$  materials obtained at 383 K for heating time of 0.5 h in the absence (a) and presence (b) of  $Na_2H_2Y$ .



Figure S16. TG curve of the  $Cu_3(OH)_2(MoO_4)_2$  microurchins in air at a heating rate of 10.0 K min<sup>-1</sup>.



Figure S17. FTIR spectrum of the  $Cu_3Mo_2O_9$  micropompons.



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**Figure S19.** FE-SEM images of the  $Cu_3Mo_2O_9$  materials obtained by sintering the  $Cu_3(OH)_2(MoO_4)_2$  microurchins at 773 (a) and 973 K (b) for 3 h under air condition.



**Figure S20.** Field dependence of magnetization of the  $Cu_3(OH)_2(MoO_4)_2$  microurchins at 2 K in the applied fields: from -50000 to 50000 Oe (a), temperature dependence of magnetization of the  $Cu_3(OH)_2(MoO_4)_2$  microurchins at 100 Oe from 2 to 300 K (b), a sketch map of linear extrapolation in achieving Curie temperature (T<sub>C</sub>) from 2 to 40 K (c), and an illustration of M/T differential coefficient method (d) in obtaining T<sub>C</sub> from 2 to 40 K.



Figure S21.  $N_2$  adsorption-desorption isotherm and pore size distribution (inset) of the  $Cu_3Mo_2O_9$  micropompons.



Figure S22. UV–Vis absorption spectra of the R6G solutions before and after being treated by the  $Cu_3Mo_2O_9$  micropompons for 150 min.