

Immobilization of cadmium ions to synthesis hierarchical flowerlike
cadmium phosphates microspheres and their application in degradation of
organic pollutants under light irradiation

Tingjiang Yan^{a, b*}, Wenfei Guan^a, Liting Cui^a, Yanqiu Xu^a, Jun Tian^a

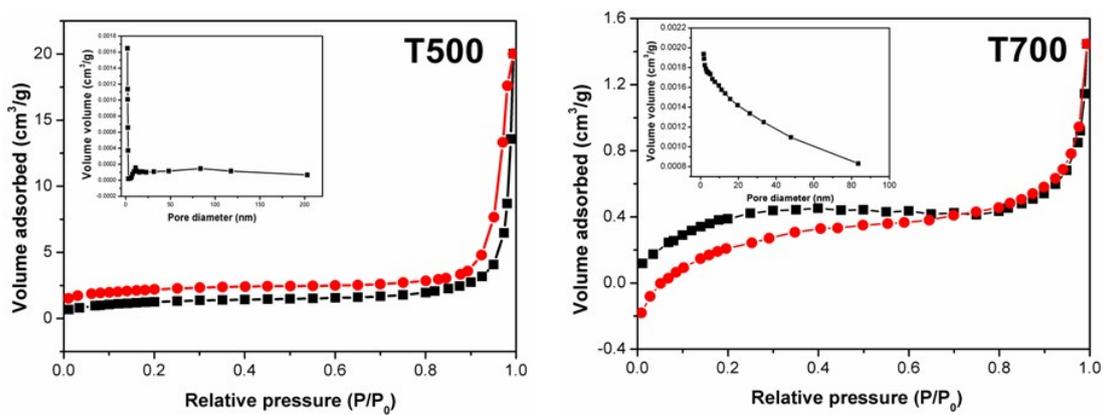


Fig. S1 Nitrogen adsorption-desorption isotherms of $\text{Cd}_5(\text{PO}_4)_2\text{P}_2\text{O}_7$ (T500 and T700). The inset is the corresponding pore-size distribution.

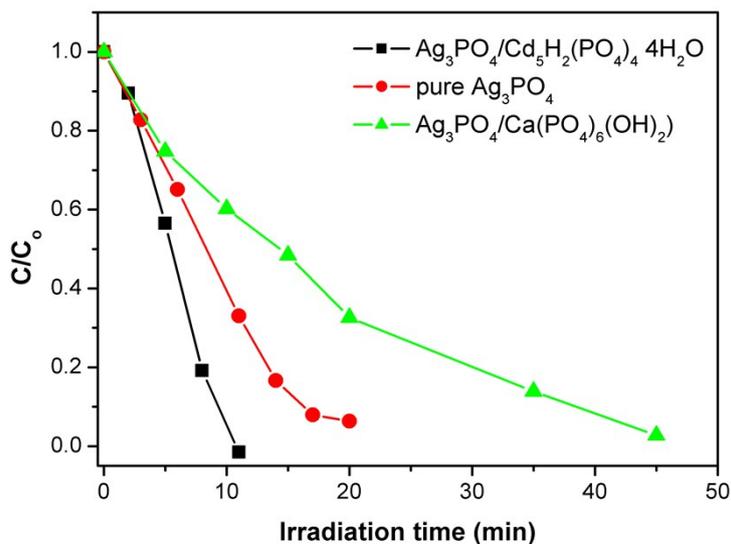


Fig. S2 Comparative photocatalytic activity of $\text{Ag}_3\text{PO}_4/\text{Cd}_5\text{H}_2(\text{PO}_4)_4 \cdot 4\text{H}_2\text{O}$ with $\text{Ag}_3\text{PO}_4/\text{Ca}(\text{PO}_4)_6(\text{OH})_2$ and pure Ag_3PO_4 under the irradiation of visible light ($\lambda > 400 \text{ nm}$). The content of Ag_3PO_4 in the composites was about 10 wt%.

The $\text{Ag}_3\text{PO}_4/\text{Cd}_5\text{H}_2(\text{PO}_4)_4 \cdot 4\text{H}_2\text{O}$ composite was prepared by a simple precipitation method similar to the preparation of $\text{Cd}_5\text{H}_2(\text{PO}_4)_4 \cdot 4\text{H}_2\text{O}$. In a typical process, $\text{Cd}(\text{CH}_3\text{COO})_2 \cdot 2\text{H}_2\text{O}$ and a certain amount of $\text{Ag}(\text{CH}_3\text{COO})$ were firstly dissolved in deionized water. Then Na_2HPO_4 aqueous solution was added dropwise to the Cd-Ag aqueous solution under stirring within 30 min. The mixture was stirred for 1 h and the resultant precipitates were collected by filtration, washed with distilled water repeatedly, and dried at $60 \text{ }^\circ\text{C}$ overnight. The $\text{Ag}_3\text{PO}_4/\text{Ca}(\text{PO}_4)_6(\text{OH})_2$ composite was prepared according to the literature.¹ Ag_3PO_4 was obtained by the reaction of $\text{Ag}(\text{CH}_3\text{COO})$ solution and Na_2HPO_4 solution at room.

Photocatalytic experiments were performed in an aqueous solution at ambient temperature. A 300 W halogen lamp (Philips Electronics) equipped with a composited cut-off filter ($400 \text{ nm} < \lambda < 800 \text{ nm}$) was used as the visible light source. The system was cooled by a fan and circulating water to maintain at room temperature. Briefly, 80 mg of photocatalyst was suspended in 80 mL aqueous solution of RhB (10 ppm). Prior to irradiation, the suspension was magnetically stirred in dark for 0.5 h to establish an adsorption–desorption equilibrium. A 3 mL aliquot was taken at several minutes intervals during the experiment and centrifuged to remove the powders. The degradation percentage is reported as C/C_0 , where C_0 is the concentration of initial RhB, and C represents the corresponding concentration at a certain time interval.

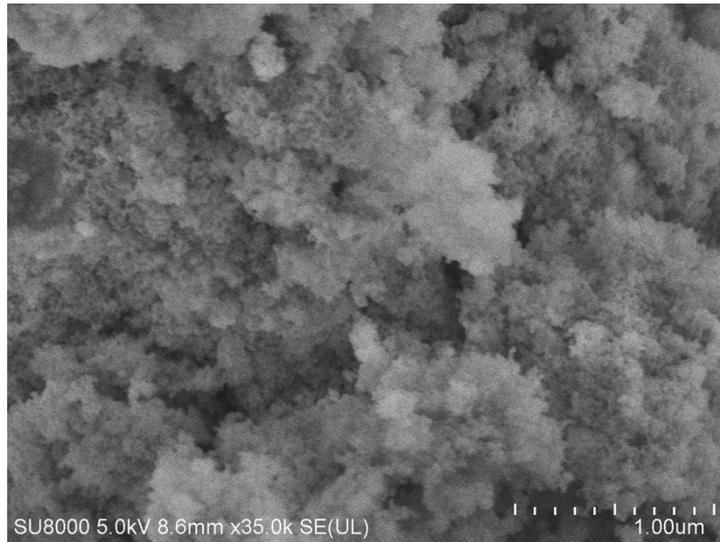


Fig. S3 SEM image of Cd₅(PO₄)₂P₂O₇ (T400) nanoparticles after 400 °C calcination.

References

- 1 X. T. Hong, X. H. Wu, Q. Y. Zhang, M. F. Xiao, G. L. Yang, M. R. Qiu and G. C. Han, *Appl. Surf. Sci.*, 2012, **258**, 4801-4805.