Supplementary Information

For

A novel Z-scheme $WO_3/CdWO_4$ photocatalyst with enhanced visible-light photocatalytic activity for the degradation of organic pollutants

Fig. S1 (a, b) represents the typical TEM images at different magnifications while (c, d) shows the HRTEM images of $WO_3/CdWO_4$ photocatalyst respectively. Fig. S1 (c, d) clearly depicts the heterostructure of $WO_3/CdWO_4$. The two kind lattice fringes confirm the existence of two different materials.

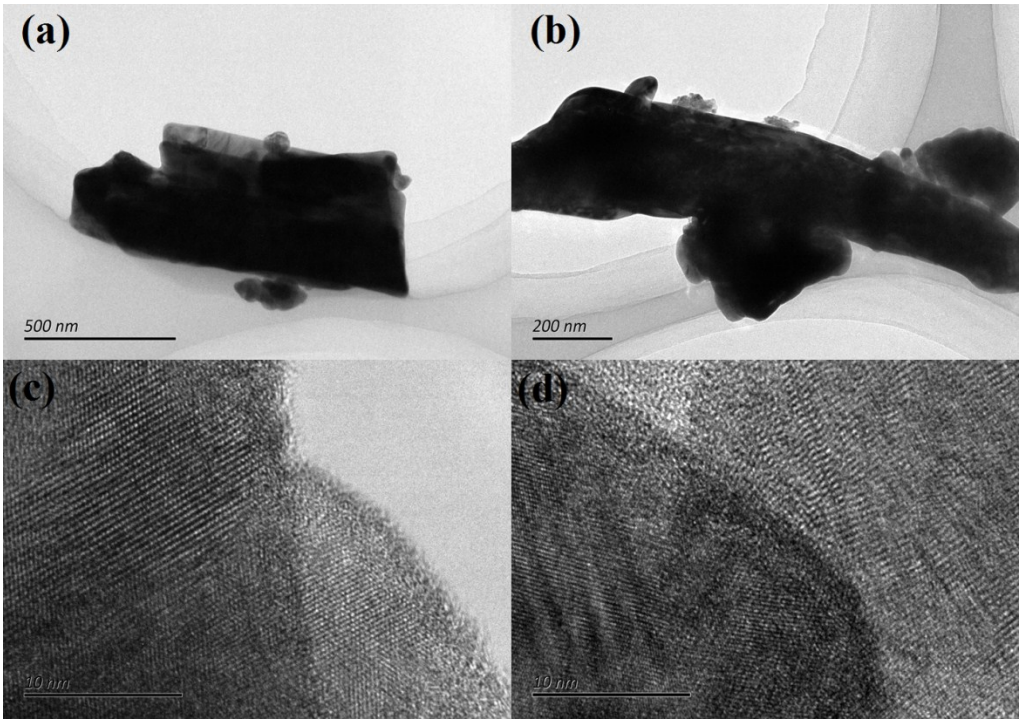

Fig. S1 (a & b) TEM images of $WO_3/CdWO_4$ photocatalyst at different magnifications, and (c & d) HRTEM images showing heterostructure of $WO_3/CdWO_4$.

Fig. S2 shows the photodegradation curves of MO, RhB and MB under visible light in the presence of $CdWO_4$, WO_3 and $WO_3/CdWO_4$ photocatalysts respectively. It can be seen that the photodegradation of organic dyes takes place as a function of irradiation time in the presence of different sample materials and obeys the first order kinetic reaction. The characteristic absorption curve of each dye decreased with the increase of irradiation time and finally disappeared after a certain time interval. In the absence of any photocatalyst, the self-degradation of organic dyes was almost negligible. Pure $CdWO_4$ and WO_3 have some certain photocatalytic efficiency in the photodegradation process and they could degrade about 85% and 90% of the dyes in 150 min and 100 min on the average respectively. It is noted that the photocatalytic performance of $CdWO_4$ was slightly less than that of WO_3 but both materials showed the best performance for the degradation of MB than that of MO and RhB as shown in Fig. S2. After combining WO_3 with $CdWO_4$, the photocatalytic activity of the heteojunction was significantly increased for the degradation of MO, RhB and MB in comparison to $CdWO_4$ and WO_3. It can be noticed from Fig. S2 (c, f and i) that $WO_3/CdWO_4$ photocatalyst takes 50 min, 40 min and 50 min for the degradation of MO, RhB and MB respectively and efficiently degraded about 95% of the dyes.

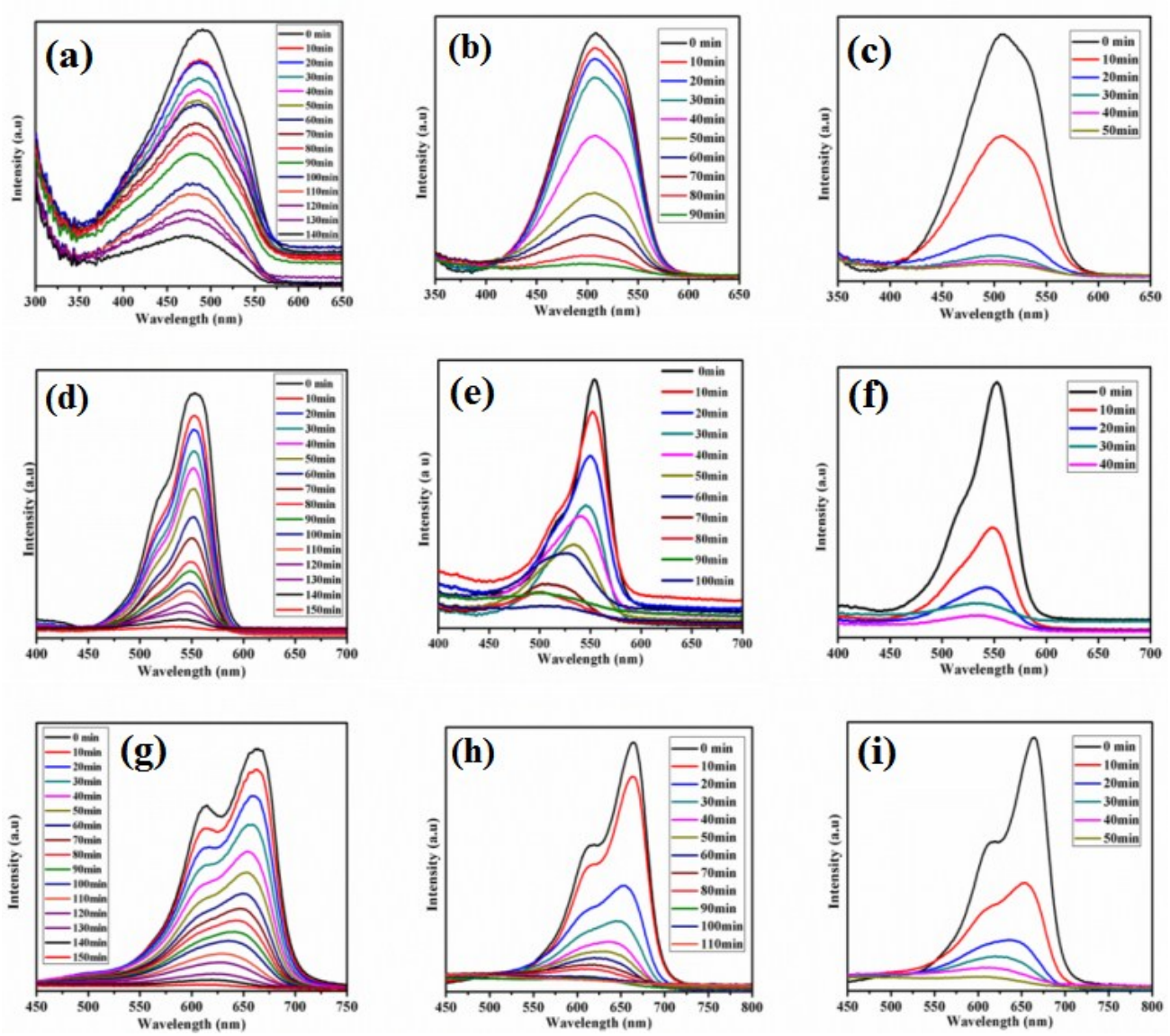

Fig. S2 Photodegradation of MO with (a) $CdWO_4$ (b) WO_3 and (c) $WO_3/CdWO_4$, Photodegradation of RhB with (d) $CdWO_4$ (e) WO_3 (f) $WO_3/CdWO_4$, and Photodegradation of MB with (g) $CdWO_4$ (h) WO_3 (i) $WO_3/CdWO_4$ respectively.

Fig. S3 shows the photostability of $WO_3/CdWO_4$, WO_3 and $CdWO_4$ for the degradation of RhB and MO respectively. It can be noticed that there is no big loss in efficiency even after the reuse of 3 cycles which represents the good stability of the photocatalyst.

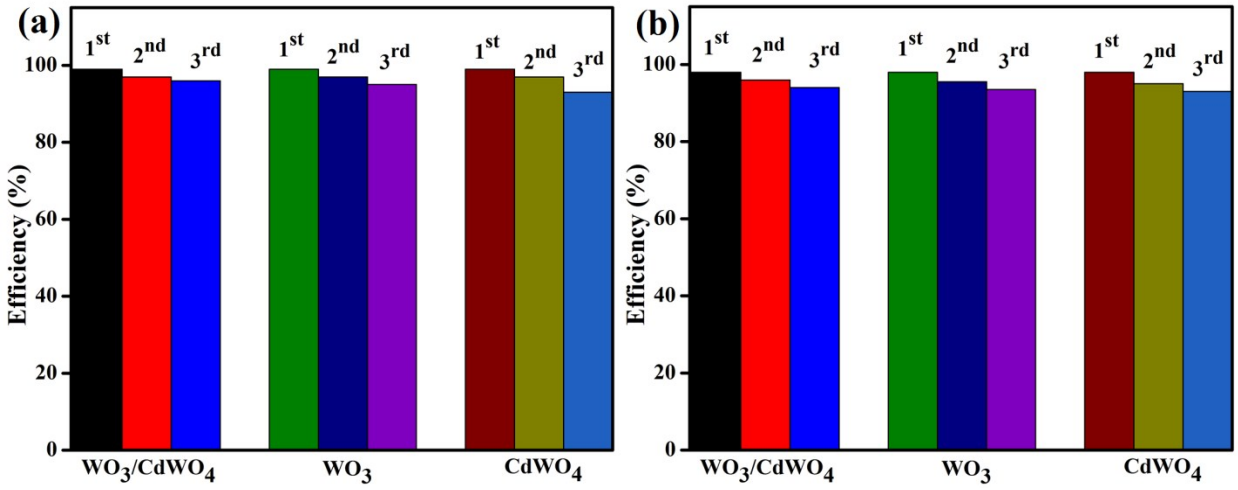

Fig. S3 The stability test of $WO_3/CdWO_4$, WO_3 and $CdWO_4$ for the degradation of (a) RhB and, (b) MO.