Electronic Supplementary Information

Effective Charge Separation and Enhanced Photocatalytic Activity by the Heterointerface in MoS₂/Reduced Graphene Oxide Composites

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Material Characterization



Figure S1. XRD patterns of MoS₂/rGO-5 composites prepared in different time of hydrothermal reaction.

Nano Measurer package was adopted to roughly evaluate the diameter of MoS_2 clusters. The diameters of MoS_2 clusters are schematically marked by the blue lines in the left panels of Figure S1and the statistic values are presented in the right panels. It can be seen that the average diameter of clusters in bare MoS_2 samples [Figure S2(a)] is about 2.34 µm, that in $MoS_2/RGO-5$ [Figure S2 (b)] and $MoS_2/RGO-10$ [Figure S1 (c)] of about 0.93 µm and 0.70 µm, respectively. So, the average diameter of MoS_2



clusters decreases after introduction of rGO, especially at a high-concentration of rGO.

Figure S2. Illustrations of the measurements of the average diameter of MoS₂ clusters: (a) bare MoS₂ samples, (b) MoS₂/RGO-5, and (c) MoS₂/RGO-10. The diameters of

MoS₂ clusters are schematically marked by the blue lines

The aggregations of MoS_2 clusters in MoS_2/RGO -5and MoS_2/RGO -10 samples are shown in Figure S3, and the aggregation parts are highlighted by dot-dashed lines.

Three aggregation regions can be identified in Figure S3 (a) but only one in Figure S3 (b). Accordingly, it can be deduced that MoS₂ clusters in the MoS₂/RGO-10 sample are more dispersive as compared to those in theMoS₂/RGO-5sample.



Figure S3. The aggregation of MoS_2 clusters in (a) $MoS_2/RGO-5$ and



(b) MoS₂/RGO-10

Figure S4. N₂ adsorption-desorption isotherm curves of the samples



Figure S5. SEM images of surface morphologies of MoS₂/rGO-5 composites at different reaction time (a) 1.5 h, no any particles; (b) 3 h, the average diameter of MoS₂ clusters is 0.45μm; (c) 6 h, 0.54μm; (d) 12 h, 0.76μm; (e) 18 h, 0.88μm; (f) 24 h, 0.93μm; (g) 30 h, 1.93μm; (h) EDS analysis of MoS₂/rGO-5 at hydrothermal reaction

time of 3h.



Figure S6. SEM image of the surface morphologies of the composites synthesized by

using graphene as the matrix at a hydrothermal reaction time of 3 h.