Effects of annealing atmosphere and rGO concentration on optical properties and enhanced photocatalytic performance of SnSe/rGO nanocomposites

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Figure S1 shows Raman spectrum of the GO sheets and SnSe/rGO (10%) nanocomposites. It can be seen, the ratio of I_D/I_G is greater than one. Therefore, GO sheets were changed to rGO sheets during the synthesis process by reducing agent.

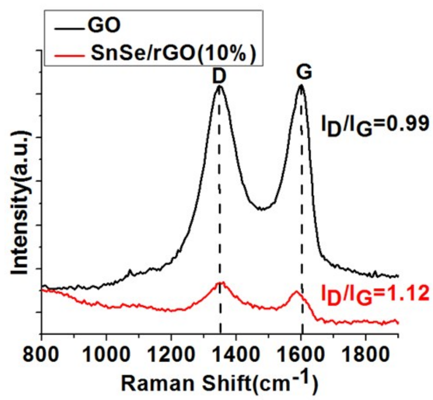

Fig. S1 Raman spectrum of the GO sheets and SnSe/rGO nanocomposites.

Figure S2 shows XRD patterns of pre- and post-annealed of the pristine SnSe NSs and SnSe/rGO nanocomposites in hydrogen and air atmosphere at 300 °C.

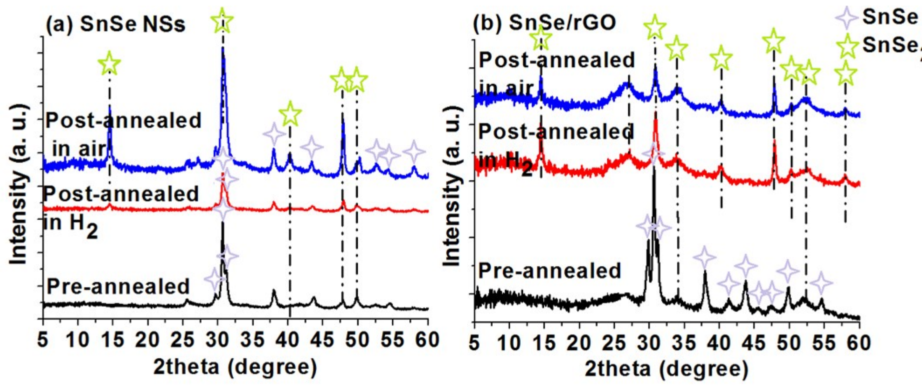

Fig. S2 XRD patterns of the pre- and post-annealed of (a) the pristine SnSe NSs and (b) SnSe/rGO nanocomposites in hydrogen and air atmosphere.

Figure S3 shows ESR peak images of pure water, MB solution, SnSe NSs, and SnSe/rGO (10%0 nanocomposites before and after illumination condition. It can be seen, the intensity of the ESR peak dramatically increase by rGO. Therefore, this result confirms that the rGO causes increase superoxide radical and resulting enhancement photocatalytic performance of the SnSe/rGO nanocomposites. Table S1 indicates ESR peak intensity of the samples. It can be seen, the intensity of the sample that has rGO is higher than the others.

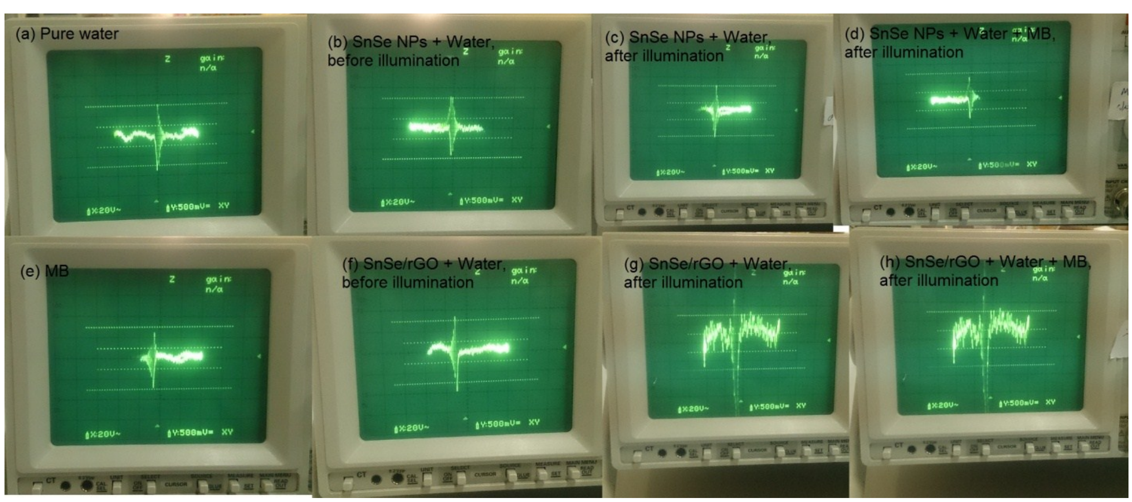

Fig. S3 ESR peak of (a) pure water, (b) SnS NSs + water befor illumination, (c) SnS NSs + water after illumination, (d) SnSe NSs + water + MB after illumination, (e) MB solution, (f) SnSe/rGO + water before illumination, (g) SnSe/rGO + water after illumination, (h) SnSe/rGO + water + MB after illumination.

Table S1. ESR peak intensity of different samples under different conditions.

Sample	ESR peak intensity (V)
Pure water	-0.6
MB	1
SnSe + water, before illumination	-0.75
SnSe + water, after illumination	-1.1
SnSe + water + MB, after illumination	-0.9
SnSe/rGO + water, before illumination	-1.1
SnSe/rGO + water, after illumination	-8
SnSe/rGO + water + MB, after illumination	-0.7

It is known, stability of a photocatalytic material after photocatalytic activity is the most important factor.[1-5] Figure S4 indicates photocatalytic activity of the pristine SnSe NSs and SnSe/rGO (10%) nanocomposites after four cycles. As can be seen, the photocatalytic activity of the SnSe/rGO nanocomposites is the same after four cycles, while, this activity is little changed for the pristine SnSe NSs after four cycles.

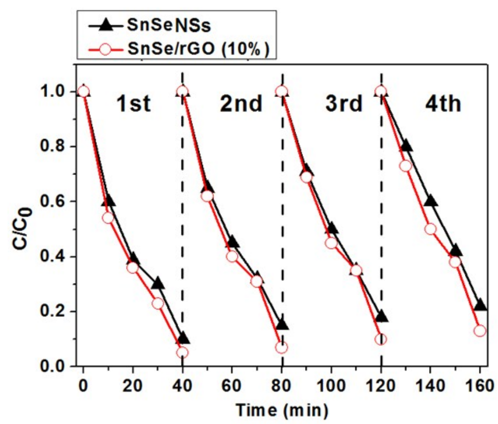

Fig. S4 Reusability test of the pristine SnSe NSs and SnSe/rGO nanocomposites catalyst for the photodegradation of MB.

Figure S5 shows the XRD patterns of the pristine SnSe NSs and SnSe/rGO (10%0 nanocomposites before and after four cycles of photocatalytic activity. It can be observed that, the phase of SnSe NSs is not be changed after four times of photocatalytic activity, while, the phase of the SnSe/rGO nanocomposites is little changed after four times of photocatalytic activity.

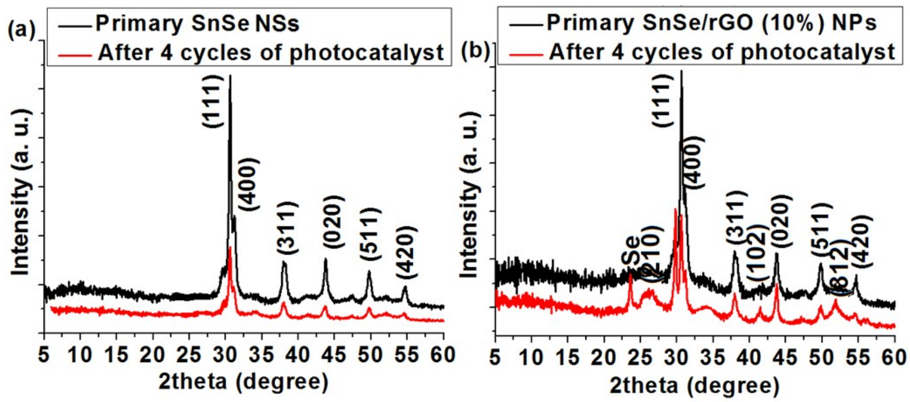

Fig. S5 XRD patterns of primary and after four cycles photocatalytic activity of (a) the pristine SnSe NSs and (b) SnSe/rGO nanocomposites to remove MB.

References

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