Electronic Supplementary Information (ESI) for

## Solution-phase synthesis of $\gamma$ -In<sub>2</sub>Se<sub>3</sub> nanoparticles for highly efficient

## photocatalytic hydrogen generation under simulated sunlight

## irradiation

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Fig. S1 SEM images of raw selenium powder at different magnifications.



Fig. S2 SEM images of the products synthesized at different injection temperatures: (a, b) 210°C;

(c, d) 220°C; (e, f) 230°C.



**Fig. S3** EDS spectra of the products synthesized at injection temperatures of (a) 210°C (microrod: the blue circle in Fig. S1b); (b) 210°C (microsphere: the blue rectangle in Fig. S1b); (c) 220°C (microsphere: the blue rectangle in Fig. S1d); (d) 230°C (microsphere: the blue rectangle in Fig. S1f).



Fig. S4 Comparison of photocatalytic hydrogen production rate of the  $\gamma$ -In<sub>2</sub>Se<sub>3</sub> nanoparticles with different amounts of Pt loaded.