

Supporting Information

High-sensitivity hybrid MoSe₂/AgInGaS quantum dots heterojunction photodetector

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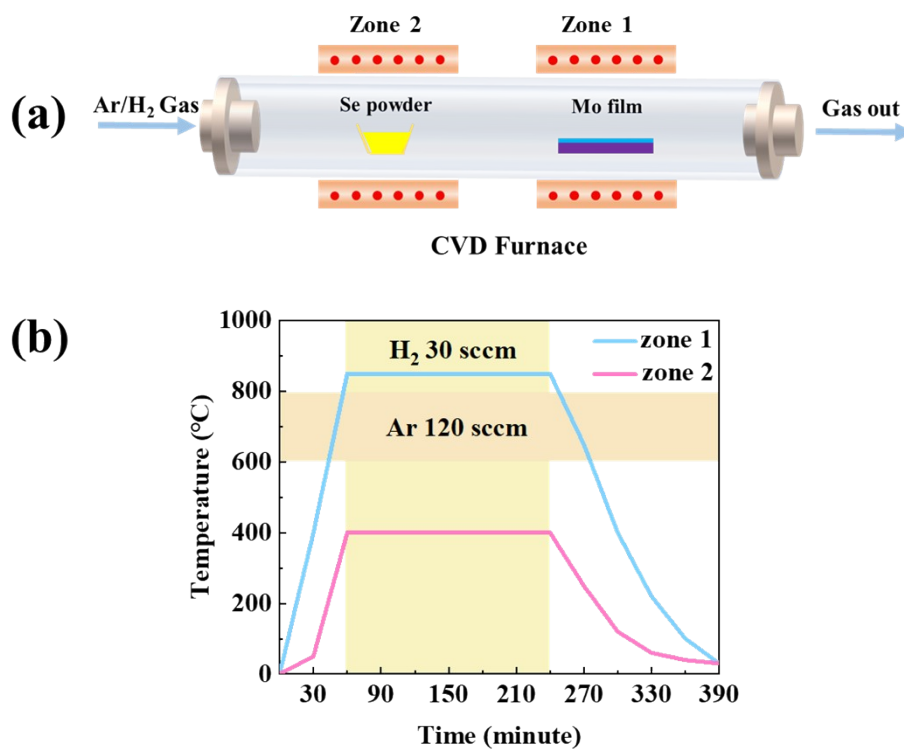


Fig.S1 (a) Schematic diagram of the quartz tube and the precursor positions. (b) The change process of reaction temperature of Zone 1 and Zone 2.

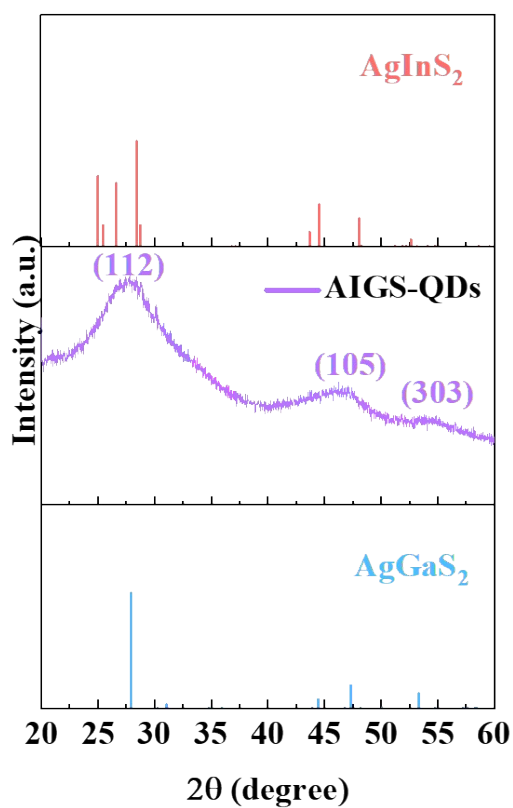


Fig.S2 XRD pattern of the AIGS-QDs. XRD patterns of AgInS₂ (PDF# 25-1328) and AgGaS₂ (PDF# 73-1233) are included as references.

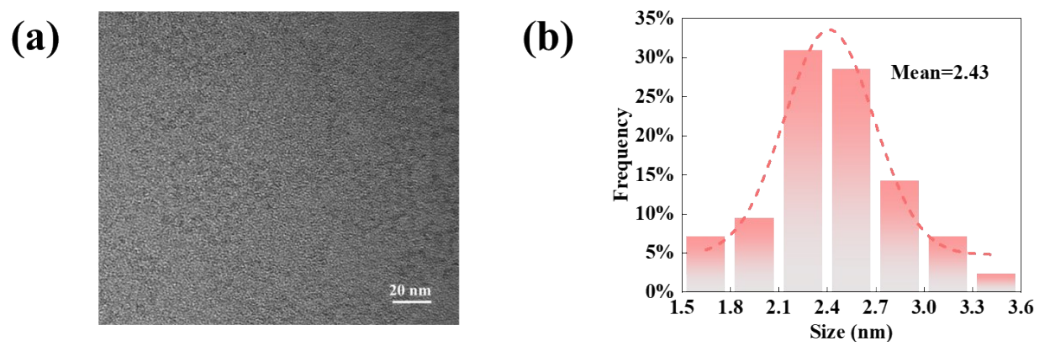


Fig.S3 (a) TEM image of the AIGS-QDs. Scale bar is 20 nm. (b) Histograms of the AIGS-QDs size distribution.

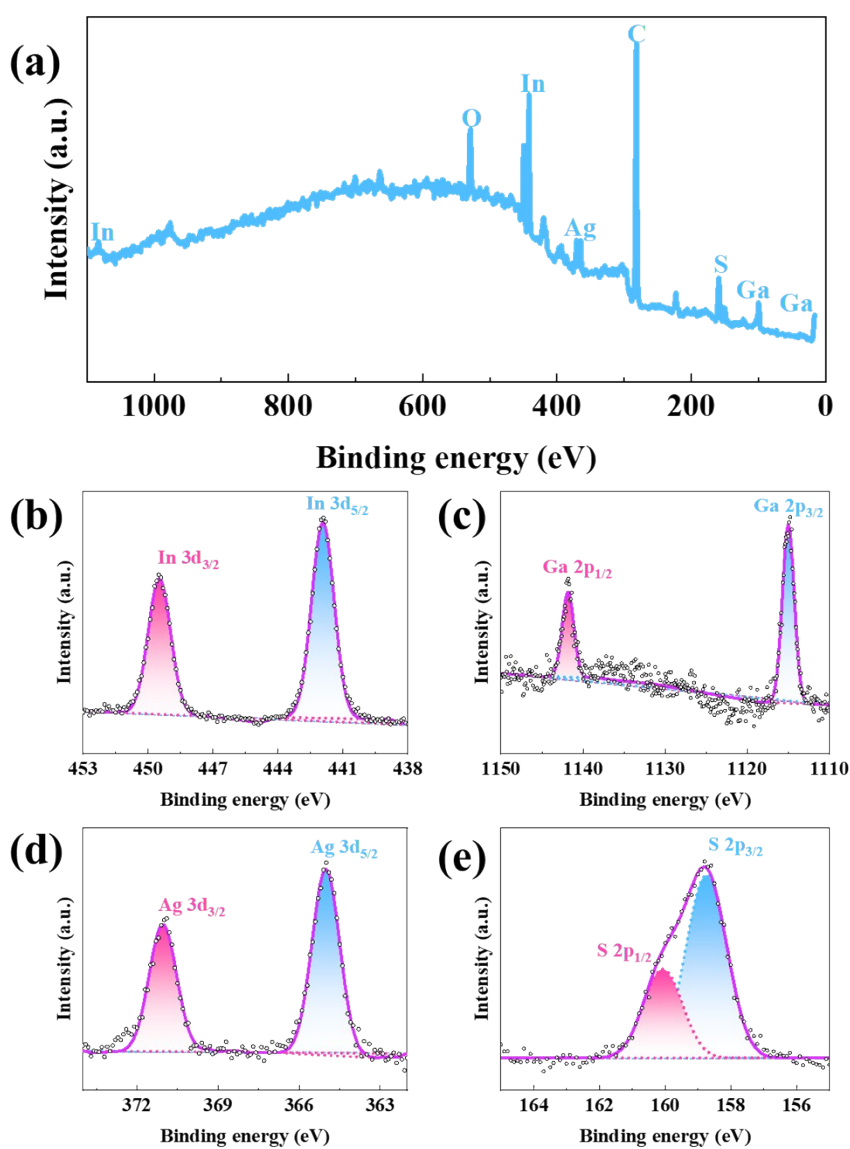


Fig.S4 XPS spectra of AIGS-QDs. (a) Survey spectrum. (b) In 3d_{3/2} and 3d_{5/2} peaks. (c) Ga 2p_{1/2} and Ga 2p_{3/2} peaks. (d) Ag 3d_{3/2} and 3d_{5/2} peaks. (e) S 2p_{1/2} and S 2p_{3/2} peaks.

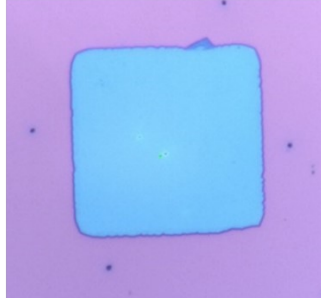


Fig.S5 Optical microscope (OM) photograph of a square ($50\ \mu\text{m} \times 50\ \mu\text{m}$) MoSe₂ film.

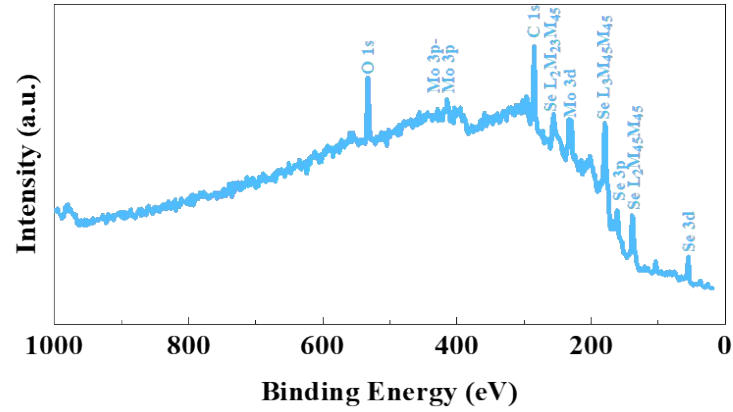


Fig.S6 XPS spectrum of MoSe₂.

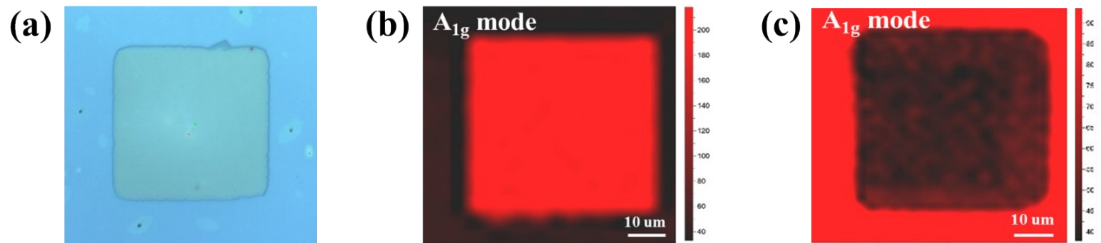


Fig.S7 (a) Optical microscope (OM) photograph of MoSe₂ film with AIGS-QDs. (b) A_{1g} mode Raman mapping. (c) A_{1g} mode Raman mapping.

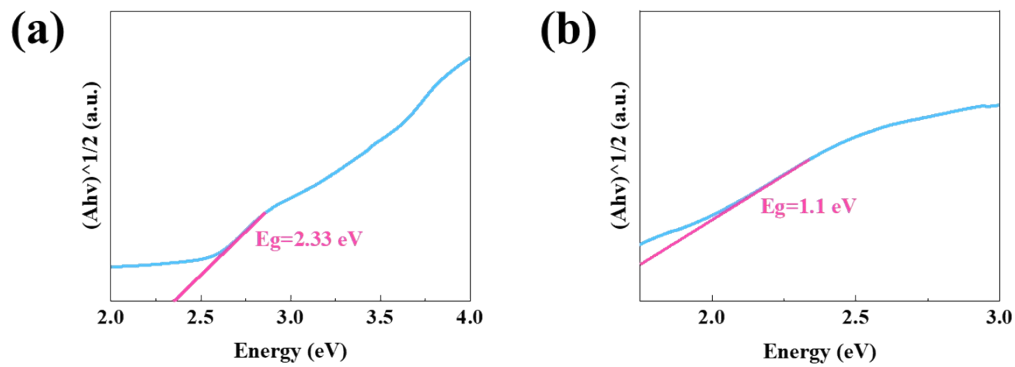


Fig.S8 Bandgap of AIGS-QDs and MoSe₂ are determined using Tauc plots.

The TRPL decay curves in Fig.2c were fitted using a biexponential decay equation to determine the lifetime of both AIGS-QDs and the MoSe₂/AIGS-QDs heterostructure.

The biexponential decay equation is given by:

$$Y(x) = y_0 + A_1 * \exp\left(\frac{-x}{\tau_1}\right) + A_2 * \exp\left(\frac{-x}{\tau_2}\right).$$

The average lifetime (τ) is calculated from the fitting parameters as an intensity

$$\text{weighted average, given by } \tau = \frac{\sum A_i \tau_i^2}{\sum A_i \tau_i} (i=1,2).$$

Table S1. PL lifetimes of AIGS-QDs and MoSe₂/AIGS-QDs heterojunction.

	y_0	A_1	τ_1 (ns)	A_2	τ_2 (ns)	R	τ (ns)
AIGS-QDs	1272.79	1872.51	1.28	1959.74	16.91	0.993	15.84
MoSe ₂ /AIGS-QDs	723.47	3500.11	1.54	1046.89	6.71	0.995	4.46