Supporting Information

Wafer-Scale Synthesis of High Quality Semiconducting Two-Dimensional Layered InSe with Broadband Photoresponse

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Table S1. Summary of performance parameters of devices based on 2D materials.

Materials	Field-effect mobility ($cm^2V^{-1}s^{-1}$)	Photodetector measurement conditions	Responsivity (A/W)	Spectral window	Ref.
Graphene (Mechanical exfoliation)	-	1550 nm V_g = 80 V	5×10^{-4}	UV-IR	[1]
1L MoS_2 (Mechanical exfoliation)	1.2	520 nm V_{ds} = 5 V	1.17	Visible-NIR	[2]
FL BP (Mechanical exfoliation)	100	640 nm V_{ds} = 200 mV	4.8×10^{-3}	Visible-NIR	[3]
1L WSe_2 (CVD)	-	532 nm V_{ds} = 5V	3.717	UV-Visible	[4]
ML WS_2 (PLD)	31	635 nm V_{ds} = 9V	0.51	UV-NIR	[5]
FL InSe (PLD)	50	370 nm V_{ds} = 1V	27	UV-NIR	This work

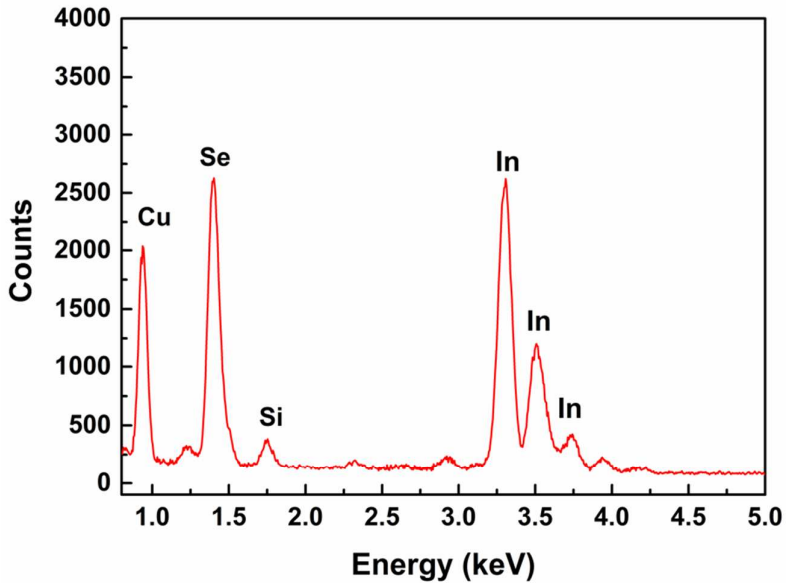

Figure S1. EDX spectrum of InSe nanosheet.

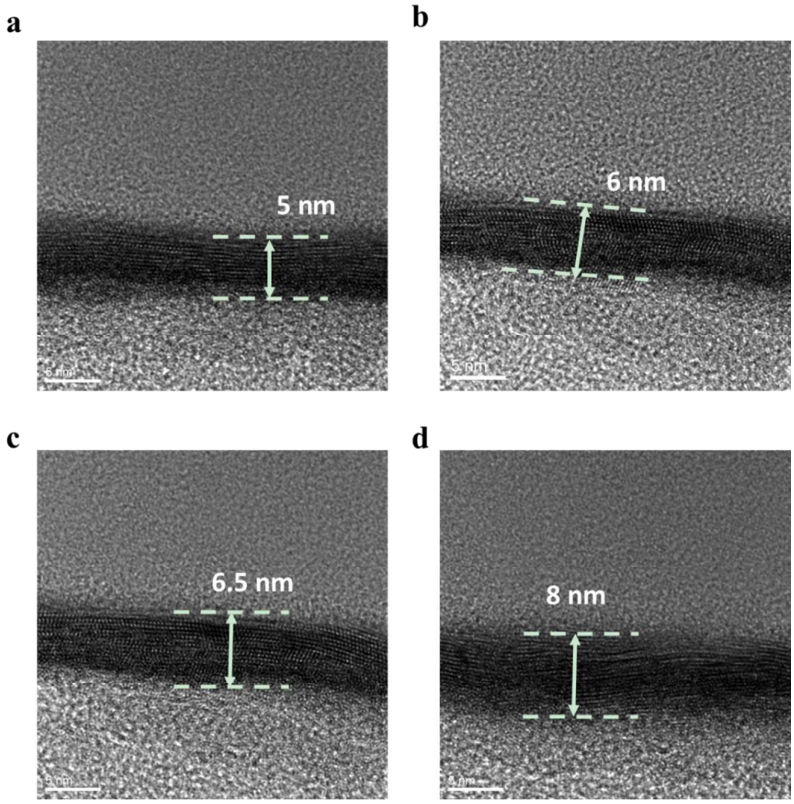

Figure S2. Cross-sectional TEM images of different thick InSe nanosheets. (a). 5 nm, (b). 6 nm, (c). 6.5 nm, (d). 8 nm.

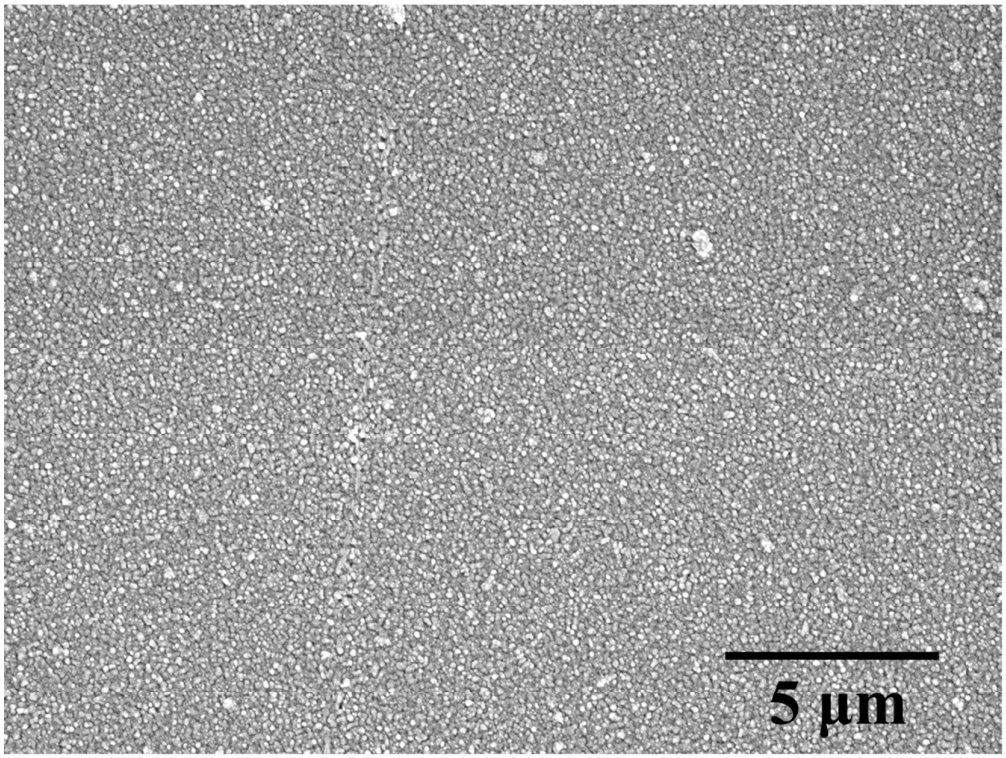

Figure S3. SEM image of monolayer InSe nanosheet.

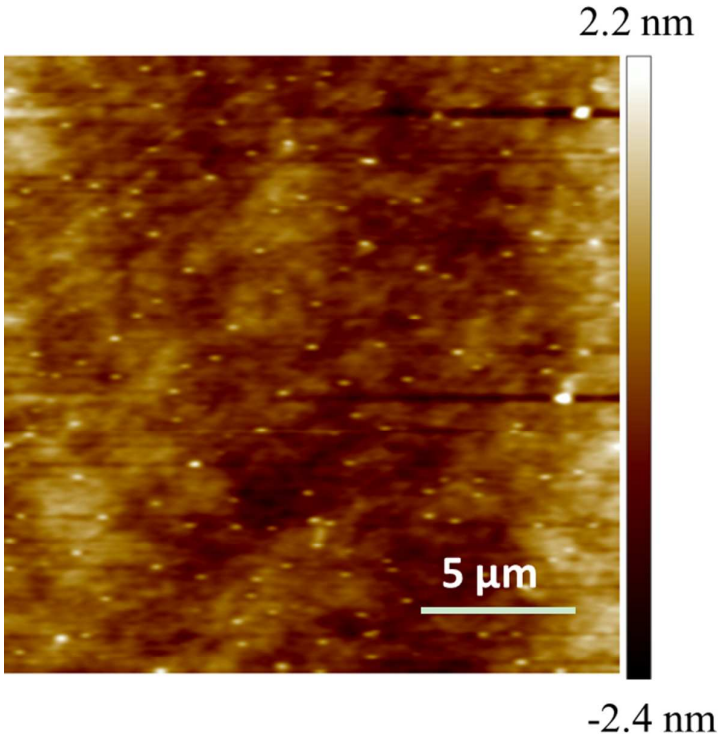

Figure S4. AFM image of InSe nanosheet with scale of 20 μm×20 μm, showing the average roughness of 0.5 nm.

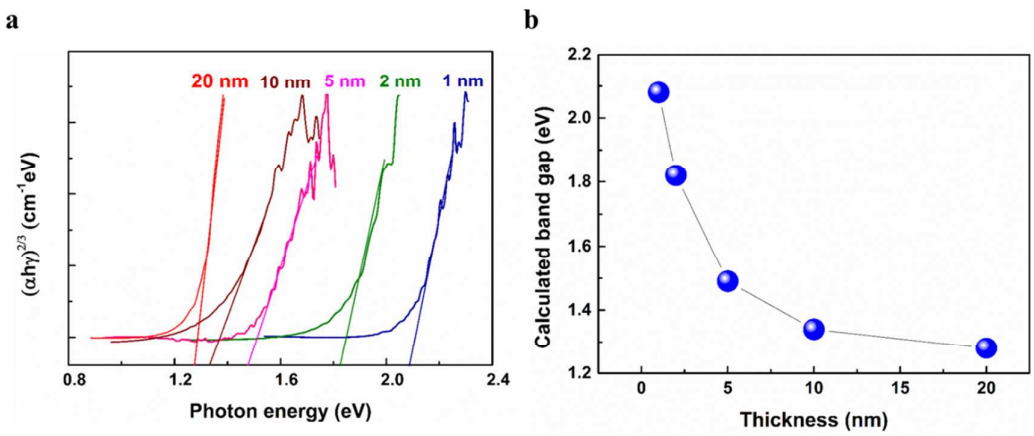

Figure S5 Optical absorption spectra of few-layer InSe. (a). Dependence of $(\alpha h\gamma)^{2/3}$ on photon energy ($h\gamma$) for InSe nanosheets with different thickness. (b). The relationship between the calculated band gap values and the film thickness from 1 nm to 20 nm.

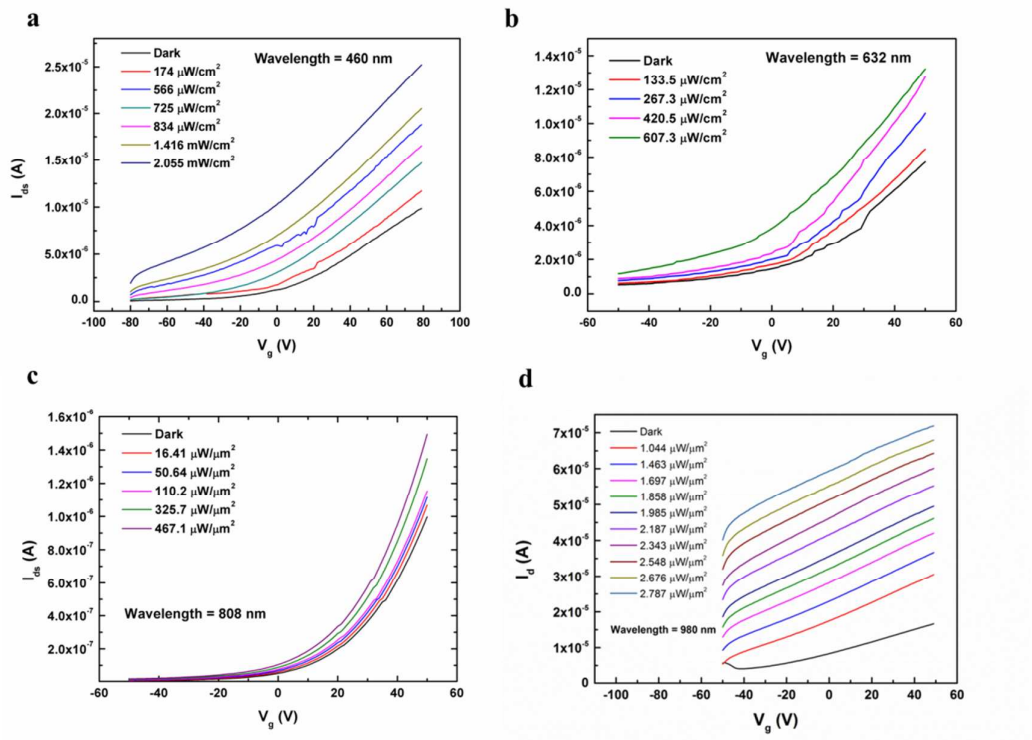

Figure S6. Phototransistor characterization of InSe nanosheet by light sources with different wavelength (a). 460 nm; (b). 632 nm; (c). 808 nm; (d). 980 nm.

References

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