Supporting Information

Stoichiometry-Controlled Synthesis and Optoelectronic Performance of 2D InSe

Dan Zheng [a,b,c], Haiwen Yu [a,b,c], Yi Liu [a,b,c], Kejing Liu [a,b,c], Zhengyi Sun [a,b,c] Jian Li [d], Baoqiang Zhang [d], Shuyu Chen [e], Ning Han [e], He Huang [f], Yerzhan Mukhametkarimov [g], Qinghua Zhao [a,b,c,], Tao Wang [a,b,c,*]*

[a] *State Key Laboratory of Solidification Processing, Northwestern Polytechnical University, Xi'an, 710072, P. R. China*

[b] *Key Laboratory of Radiation Detection Materials and Devices, Ministry of Industry and Information Technology, Xi'an, 710072, P. R. China*

[c] *Research &Development Institute of Northwestern Polytechnical University in Shenzhen, Shenzhen, 518063, P. R. China*

[d] *Imdetek Corp. Ltd, Xi'an, 610000, P.R. China*

[e] *Chongqing Jianan Instruments Co., Ltd, Chongqing, 400060. P.R. China*

[f] *Digital Publishing Department, Shaanxi Science and Technology Press, Xi'an, 710061 P.R. China*

[g] *al-Farabi Kazakh National University, Al-Farabi av. 71/23, Almaty 050040, Kazakhstan*

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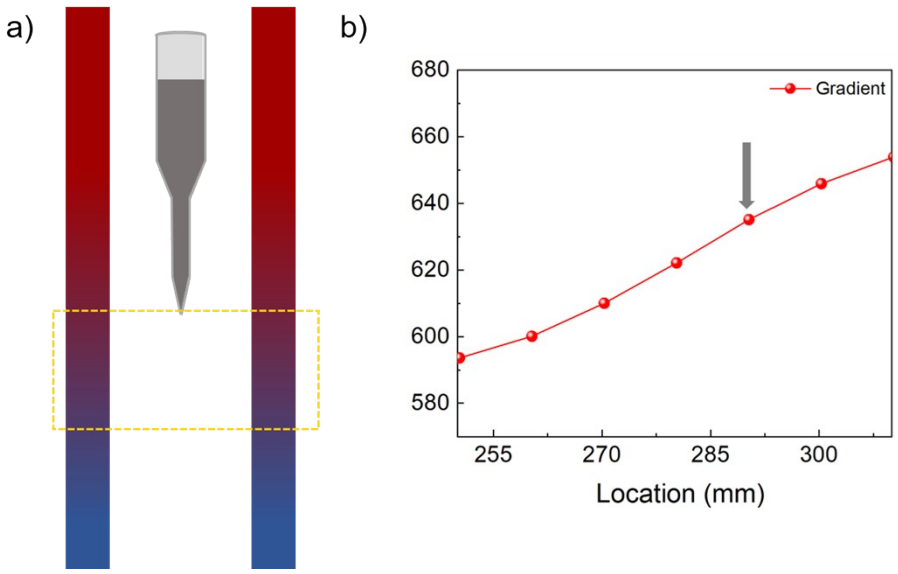

Figure S1. Schematic diagram of the vertical Bridgman method crystal growth process. a) Temperature field distribution within the furnace. b) Temperature field of crystal growth

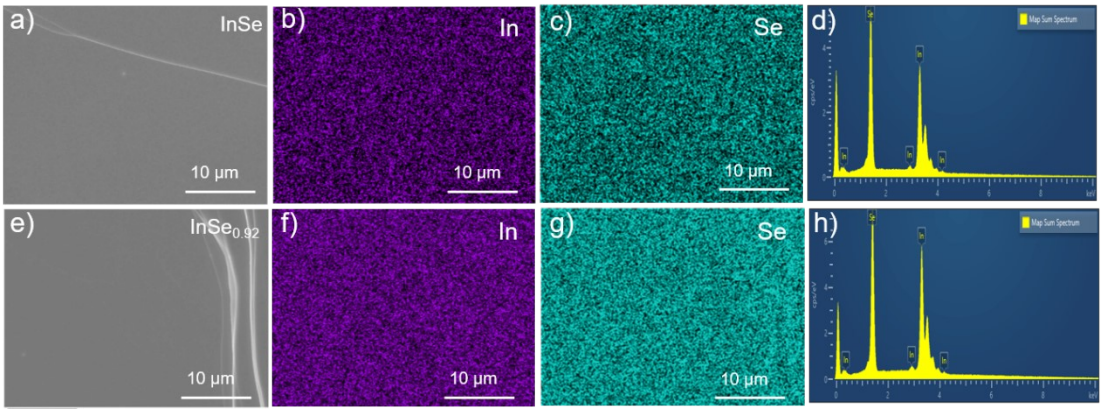

Figure S2. Element composition of InSe and $InSe_{0.92}$. a,e) Low-magnification SEM images of InSe and $InSe_{0.92}$, respectively. b,c) EDS mapping of In and Se elements in (a). d) EDS spectrum of InSe captured from squre of (a). (f, g) EDS mapping of In and Se elements in (e). h) EDS spectrum of $InSe_{0.92}$ captured from squre of (e).

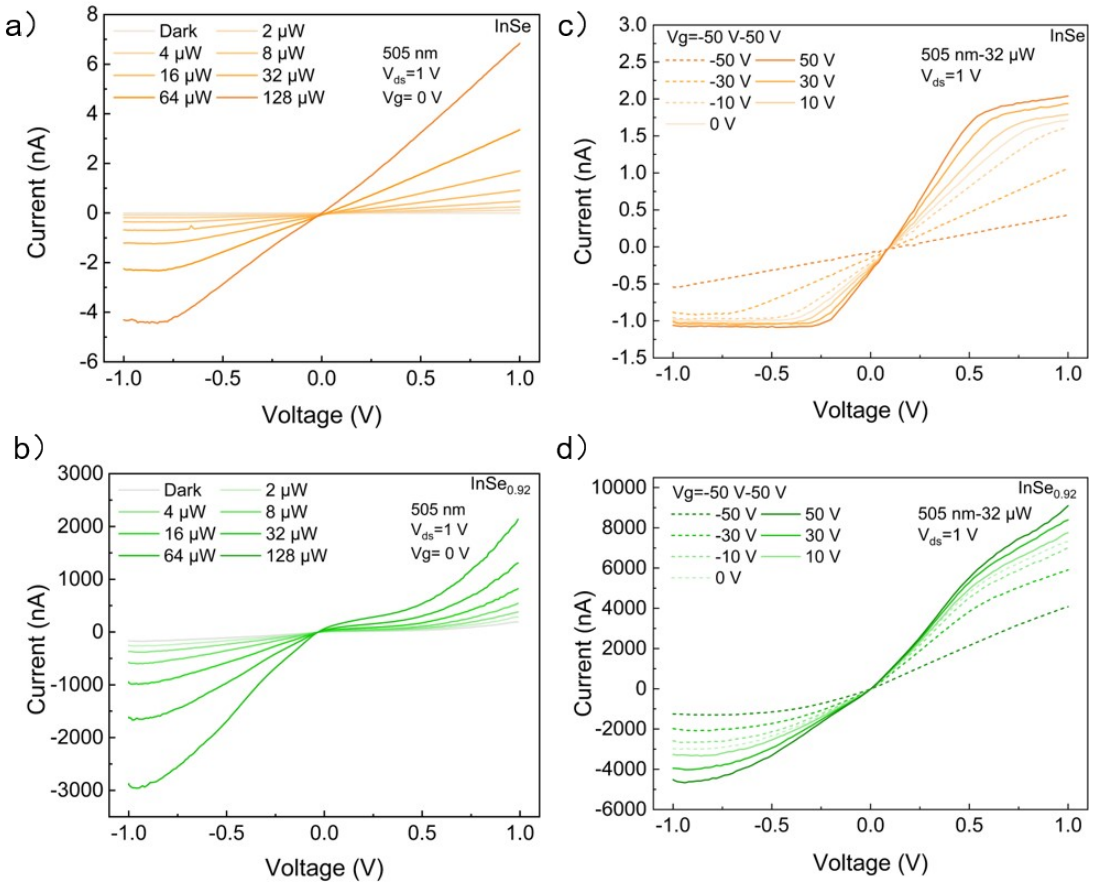

Figure S3. Electrical property characterizations of InSe and $InSe_{0.92}$ based back-gate photodetector devices. a, b) I-V output curves at various 505 nm laser power density of InSe and $InSe_{0.92}$, respectively. c, d) I-V output curves of InSe and $InSe_{0.92.}$ with back-gate operated (V_G=-50-50 V) under 505 nm illumination with power density of 0.0255 W/cm^2.

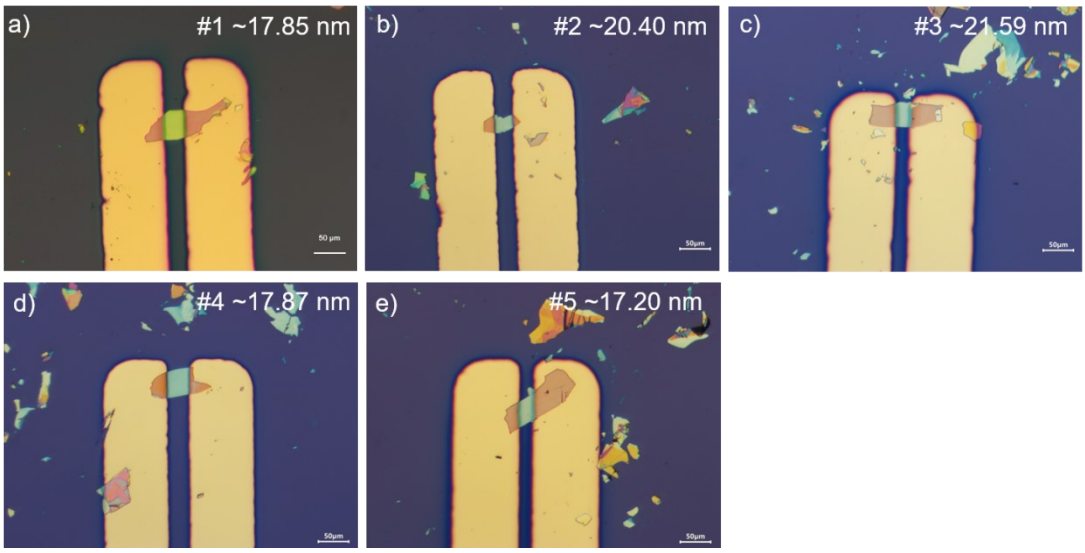

Figure S4. Optical images of five investigated InSe photodetectors with the same structure labeled #1 to #5.

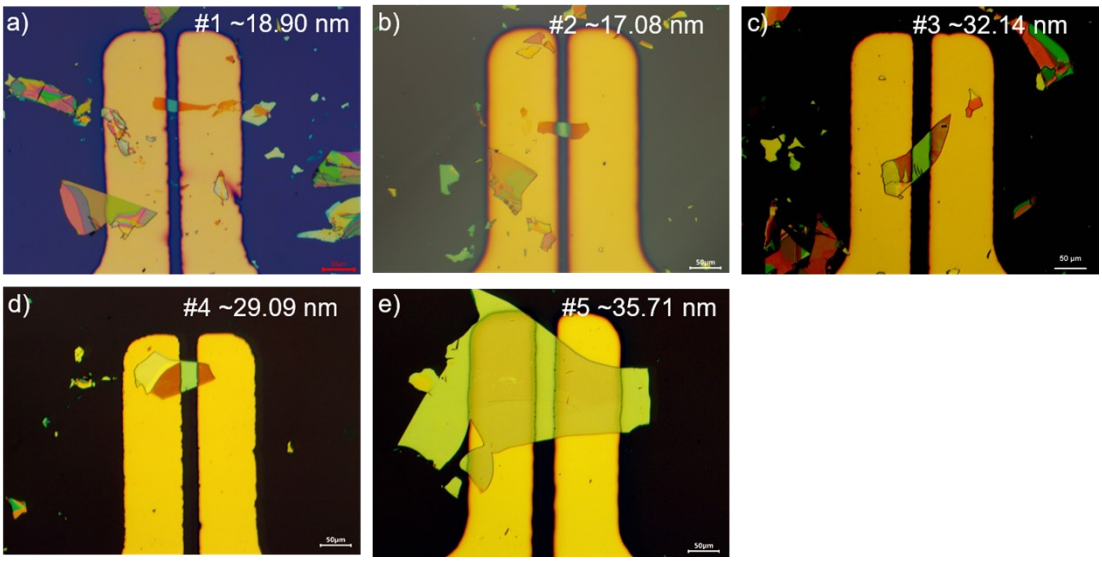

Figure S5. Optical images of five investigated $InSe_{0.92}$ photodetectors with the same structure labeled #1 to #5.