

## Supporting Information

### Polarization sensitive photodetector based on quasi-1D ZrSe<sub>3</sub>

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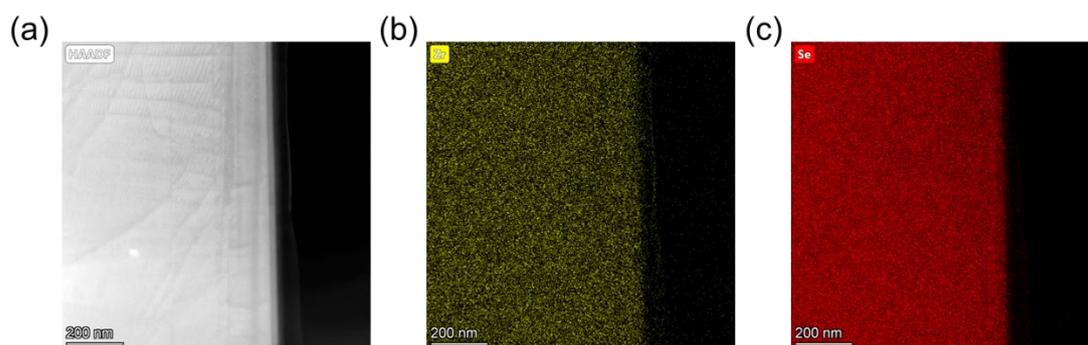


Fig. S1 (a) HAADF of quasi-ZrSe<sub>3</sub>. (b, c) Zr and Se elemental mapping of quasi-1D ZrSe<sub>3</sub>.

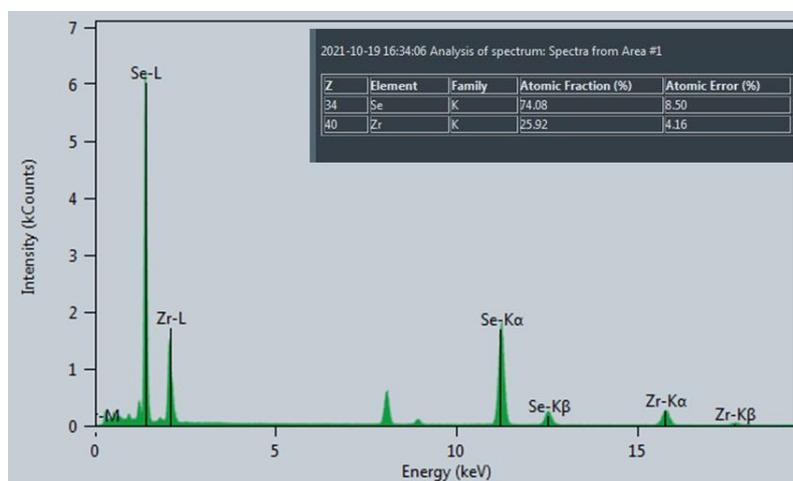


Fig. S2 TEM-EDX spectrum of quasi-1D ZrSe<sub>3</sub>.

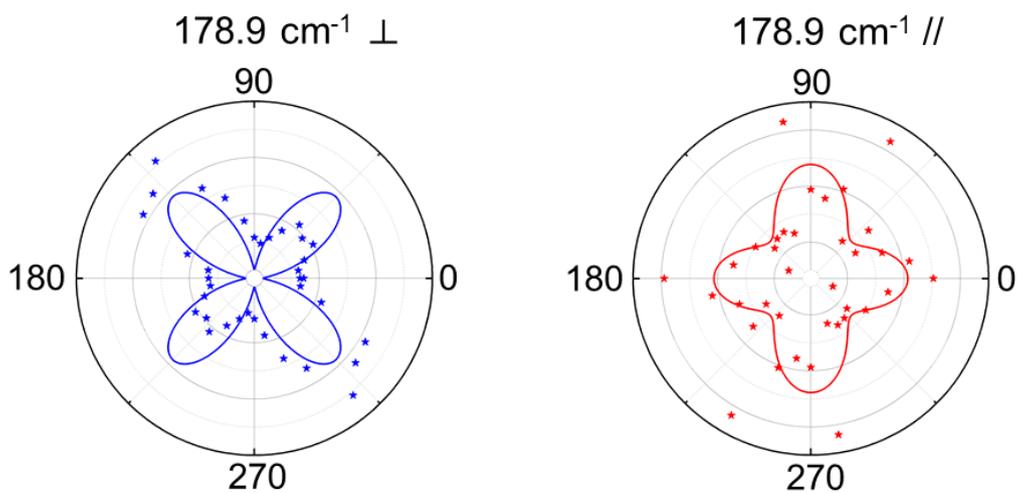


Fig. S3 Polar plots of angle-resolved and fitted peak intensities of  $178.9 \text{ cm}^{-1}$ .

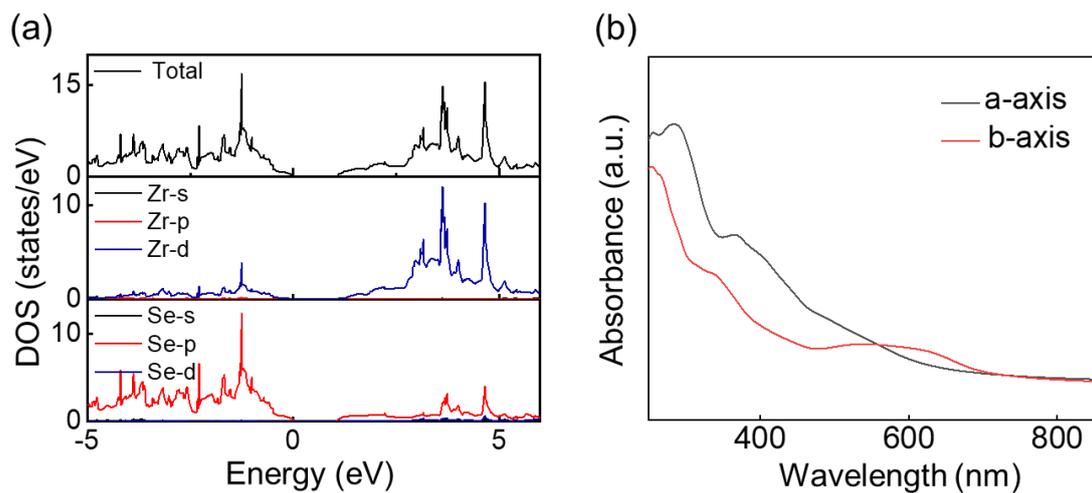


Fig. S4 (a) The total density of state and partial density of state for  $\text{ZrSe}_3$ . (b) The calculated absorption spectra along the a-axis and b-axis for  $\text{ZrSe}_3$ .

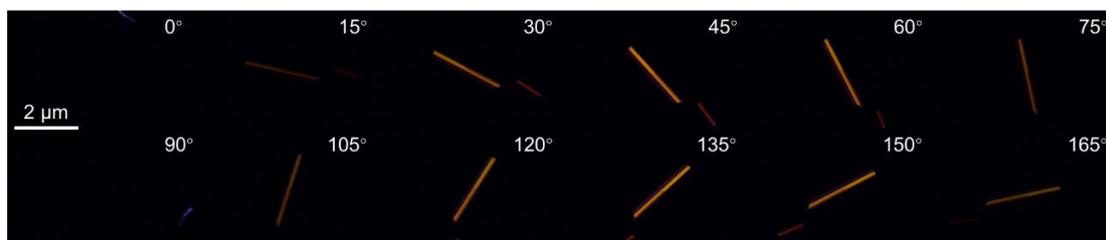


Fig. S5 Polarization-resolved optical microscope (PROM) images of quasi-1D  $\text{ZrSe}_3$  with polarized direction varying from  $0^\circ$  to  $165^\circ$ .

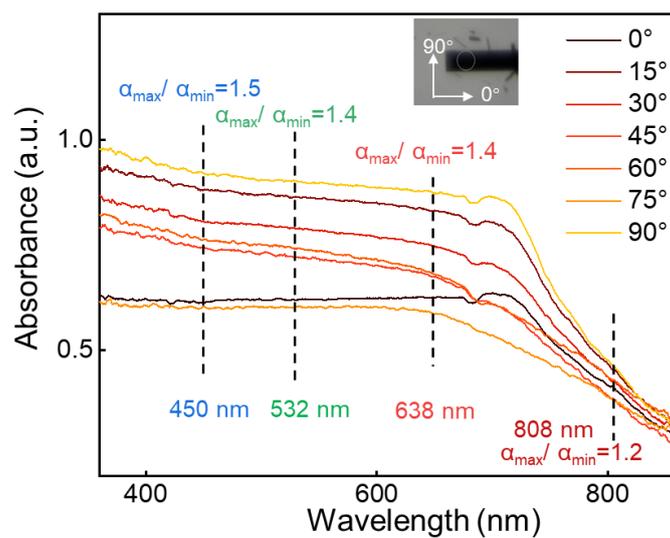


Fig. S6 Absorption spectra of quasi-1D ZrSe<sub>3</sub> under a beam of linearly polarized light, where the polarization direction varies from 0° to 90°.

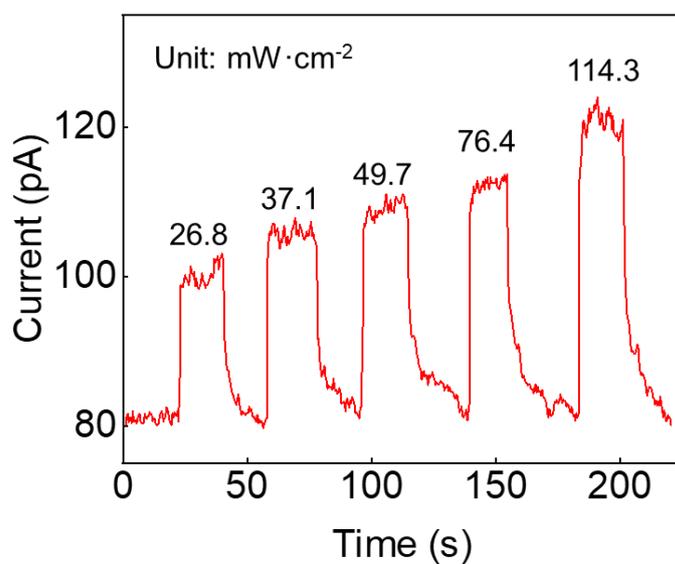


Fig. S7 Time-resolved photoresponse of the ZrSe<sub>3</sub>-based photodetector for a bias voltage of 5 V under 360 nm.

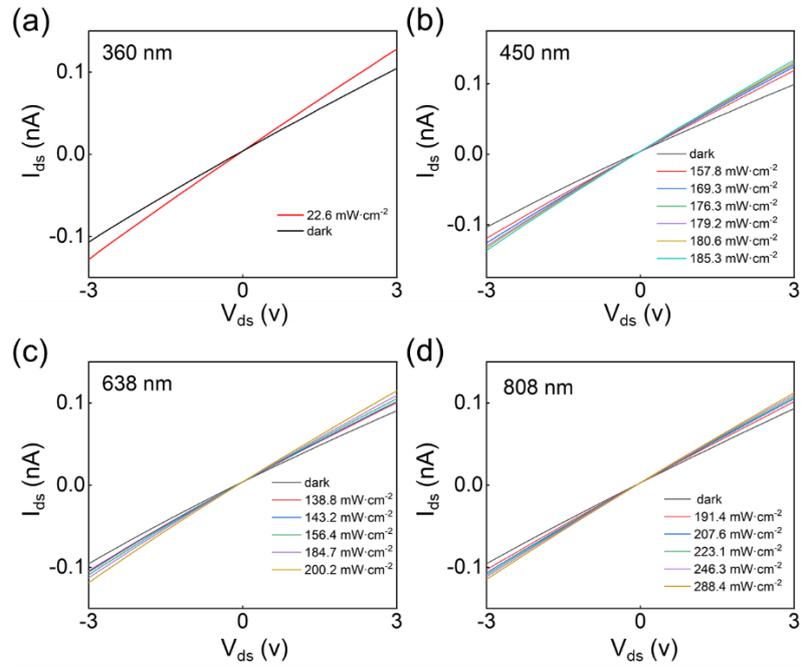


Fig. S8  $I$ - $V$  curves of ZrSe<sub>3</sub>-based photodetectors in dark and light at 360, 450, 638, 808 nm.

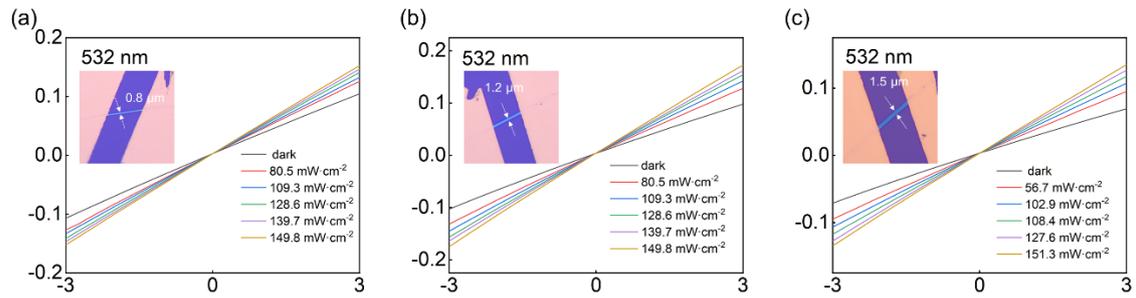


Fig. S9  $I$ - $V$  curves of ZrSe<sub>3</sub>-based photodetector with width of (a) 0.8, (b) 1.2 and (c) 1.5  $\mu$ m at 532 nm.