Supplementary Information

Photoconductive Properties of Polycrystalline Selenium Based Lateral MISIM Photodetectors of High Quantum Efficiency using Different Dielectrics as the Charge Blocking Layer

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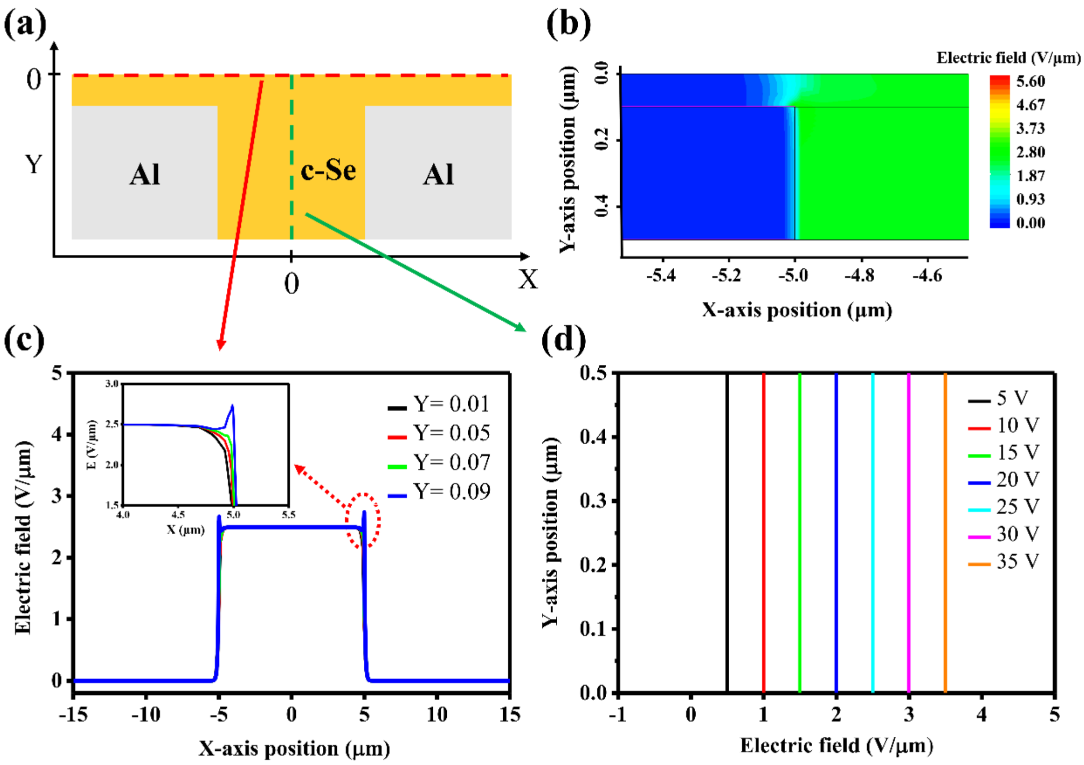

Figure S1

The TCAD simulation is based on the lateral Al/c-Se/Al MSM device structure, in which the c-Se layer and the Al electrodes have a thickness of 500 and 400 nm, respectively (Fig. S1(a)). Figure S1(b) presents the electric field distribution map for an area around the left Al electrode of the device biased at 25 V, showing a field strength about 2.5 V/μm in the c-Se region. The electric field becomes negligible above the Al electrodes, suggesting that photocarriers produced right above the electrodes will suffer severe recombination and contribute insignificantly to the measured photocurrent. Figure S1(c) shows the lateral electric field distribution across a region of 30 μm in width at different separations (Y) from the surface of the c-Se layer of the MSM device biased at 25 V. The electric field is uniformly distributed in the c-Se region between the Al electrodes (2.5 V/μm) except the area near the edge of the electrodes (e.g., 2.7 V/μm at X= 5 μm, Y = 0.09 μm). Figure S1(d) shows the electric field distribution from the top to the bottom of the c-Se layer at the middle between the two electrodes (X = 0) at different applied voltages, demonstrating a uniform vertical electric distribution, which allows effective collection of photocarriers generated in the light absorption region (from the surface of the c-Se layer to a depth of ~300 nm) by the underlying electrodes.