

Target:

Towards wafer-scale integration of air stable QDs on commercial silicon read-out integrated circuits.

Challenges:

- Facile, localized QD film patterning
- Long life-time photostability

Transfer Printing Approach:

Selective pick-and-print of Al_2O_3 passivated QD assemblies on device structures with high precision.

Scalability

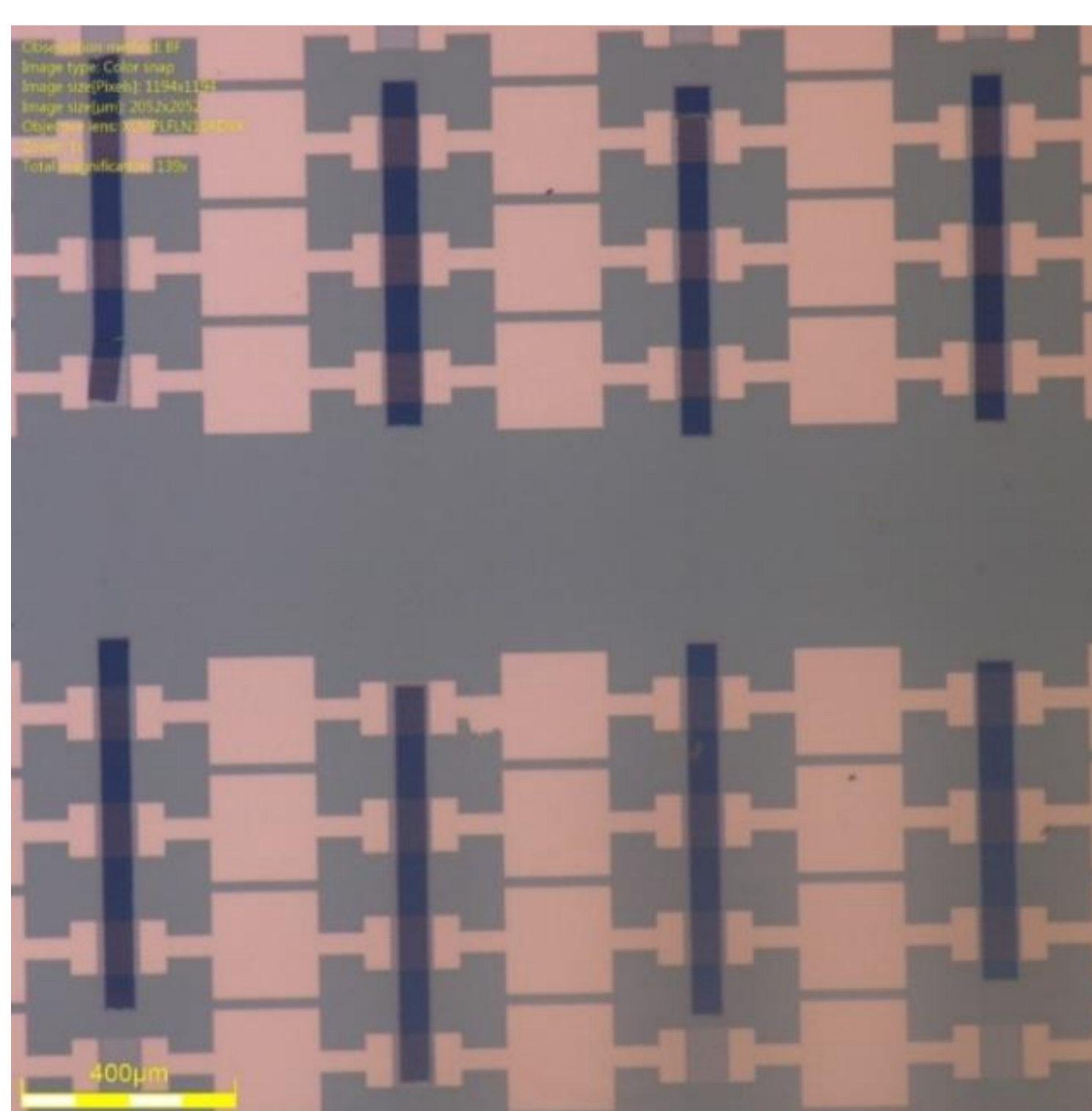


Fig.2 Integrated Arrays of printed Al_2O_3 @ $\text{PbS}_{2.1\mu\text{m}}$ QD photoconductors

Transfer Printing Process Flow

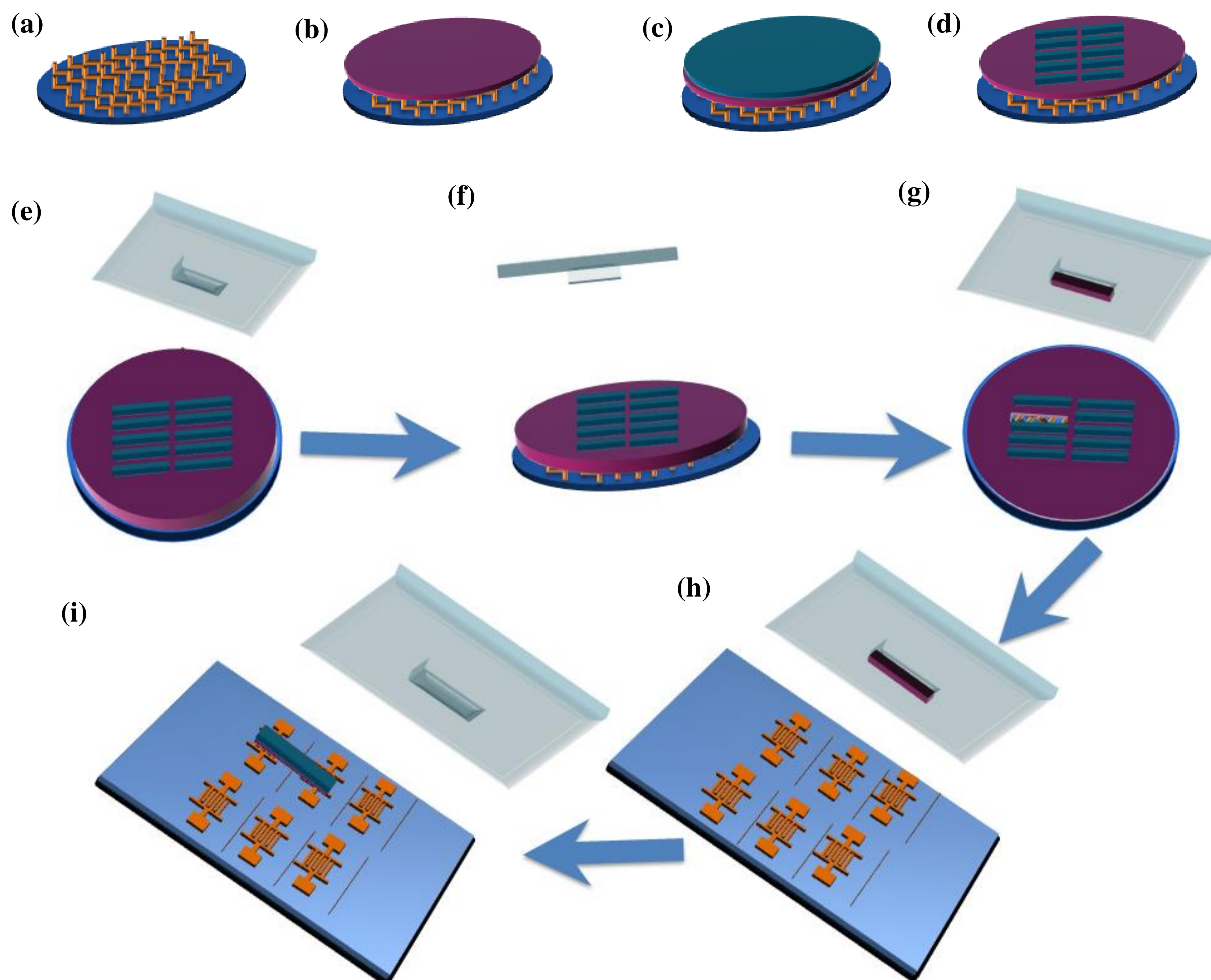


Fig.1 (a-d) **Source substrate preparation**, including ODTS-Si preparation, QDs spin coating and ALD- Al_2O_3 encapsulation. (e-i) **Pick-and-Print** of Al_2O_3 /PbS patches on interdigitated electrodes on an oxidized Si wafer

Al_2O_3 @ $\text{PbS}_{2.1\mu\text{m}}$ QD photoconductor characterization

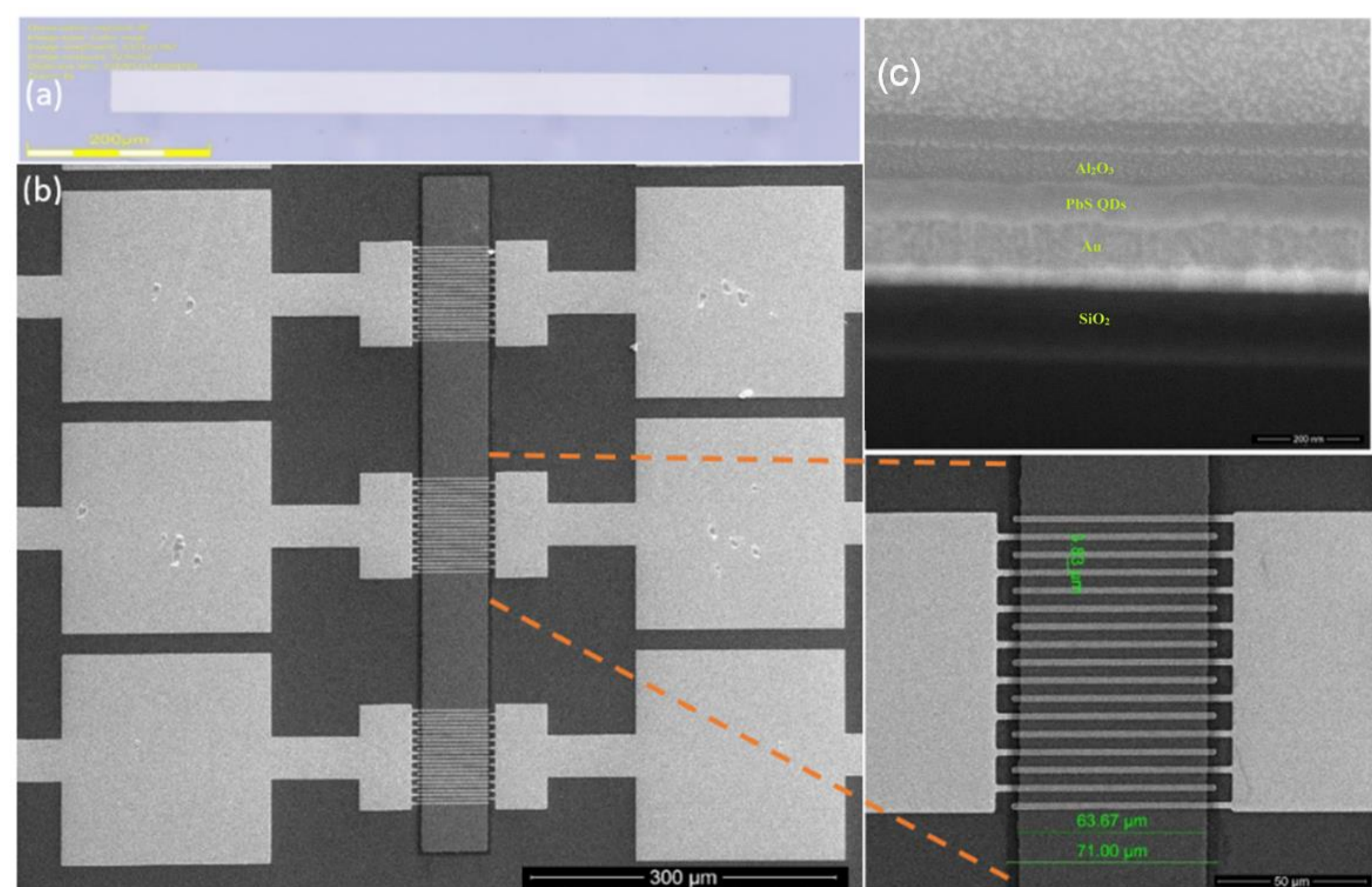


Fig.3 (a) optical image of the source substrate after pattern pick-up, (b) Printed Al_2O_3 /PbS QD photoconductor, and (c) cross section.

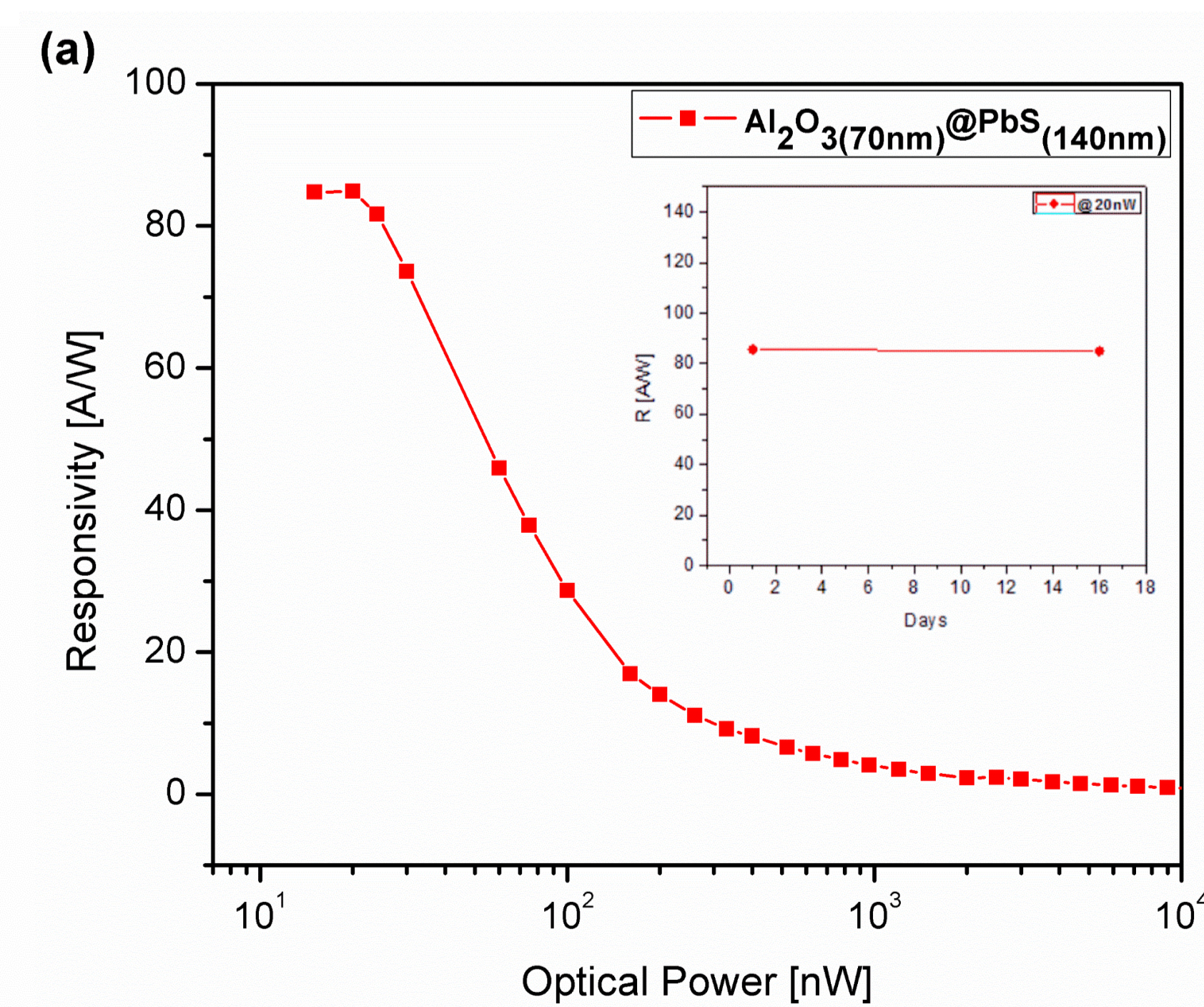
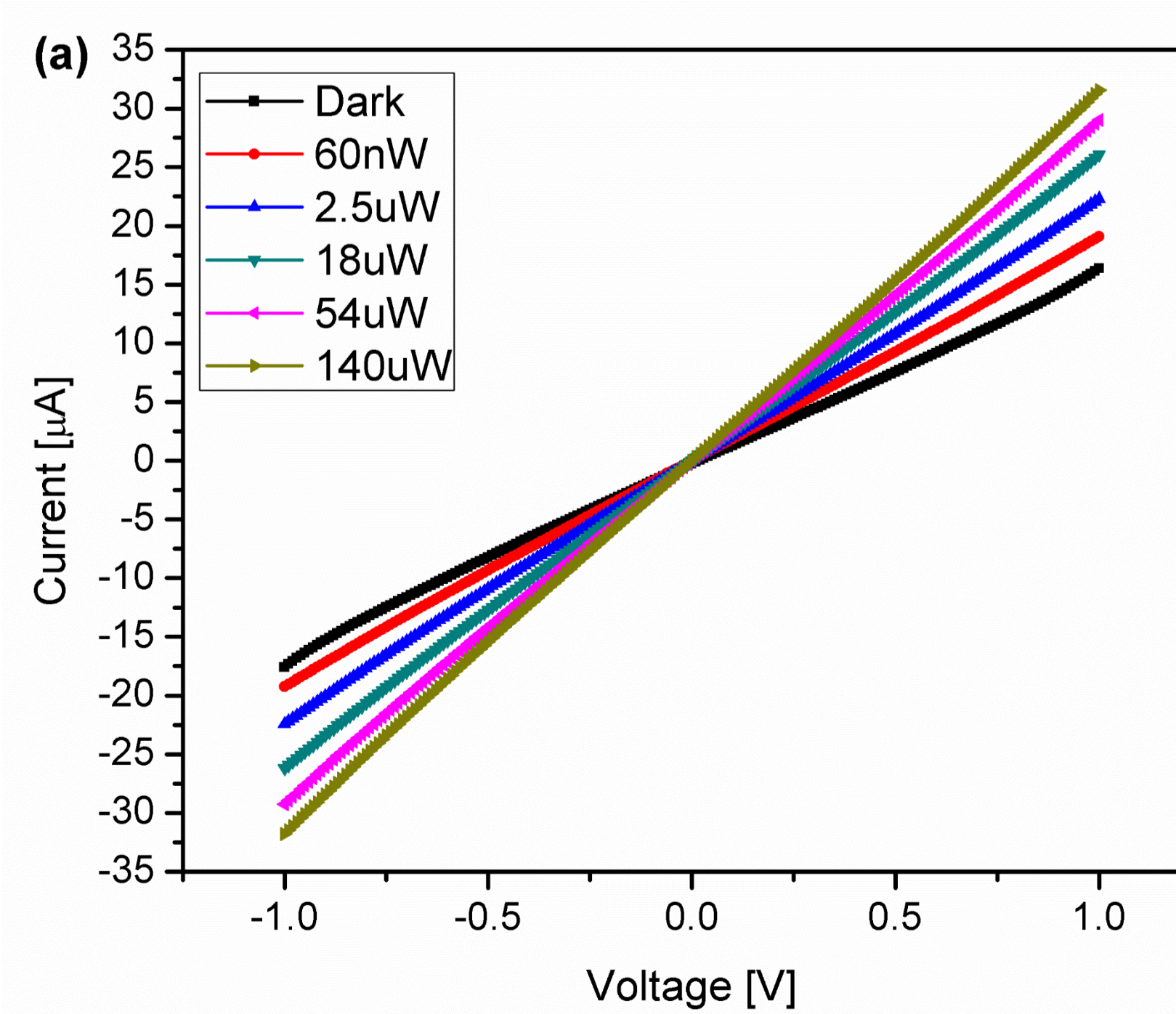


Fig.4 (a) IV characteristics in dark and under surface illumination at $2.1\ \mu\text{m}$, and (b) corresponding responsivity and (inset) life-time stability

