



# Method to Characterize Isolated CdTe Microarrays

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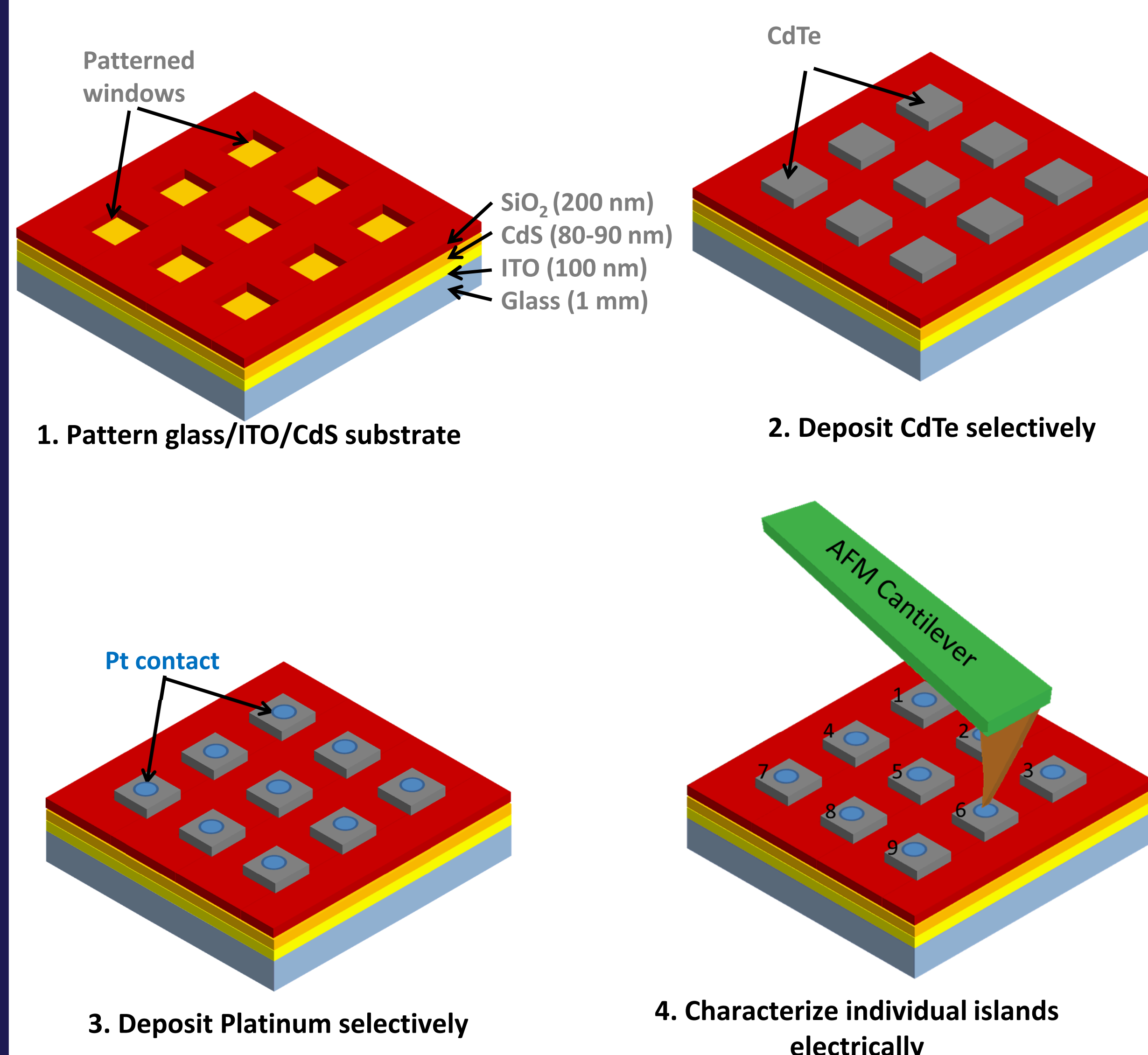
## Motivation

Polycrystalline CdTe thin films are grown with defects that degrade the electrical performance of solar cells. A characterization technique is still needed to separate the effect of defects in the performance of solar cells. Open circuit voltages could be highly increased if detrimental defects are reduced.

## Objective

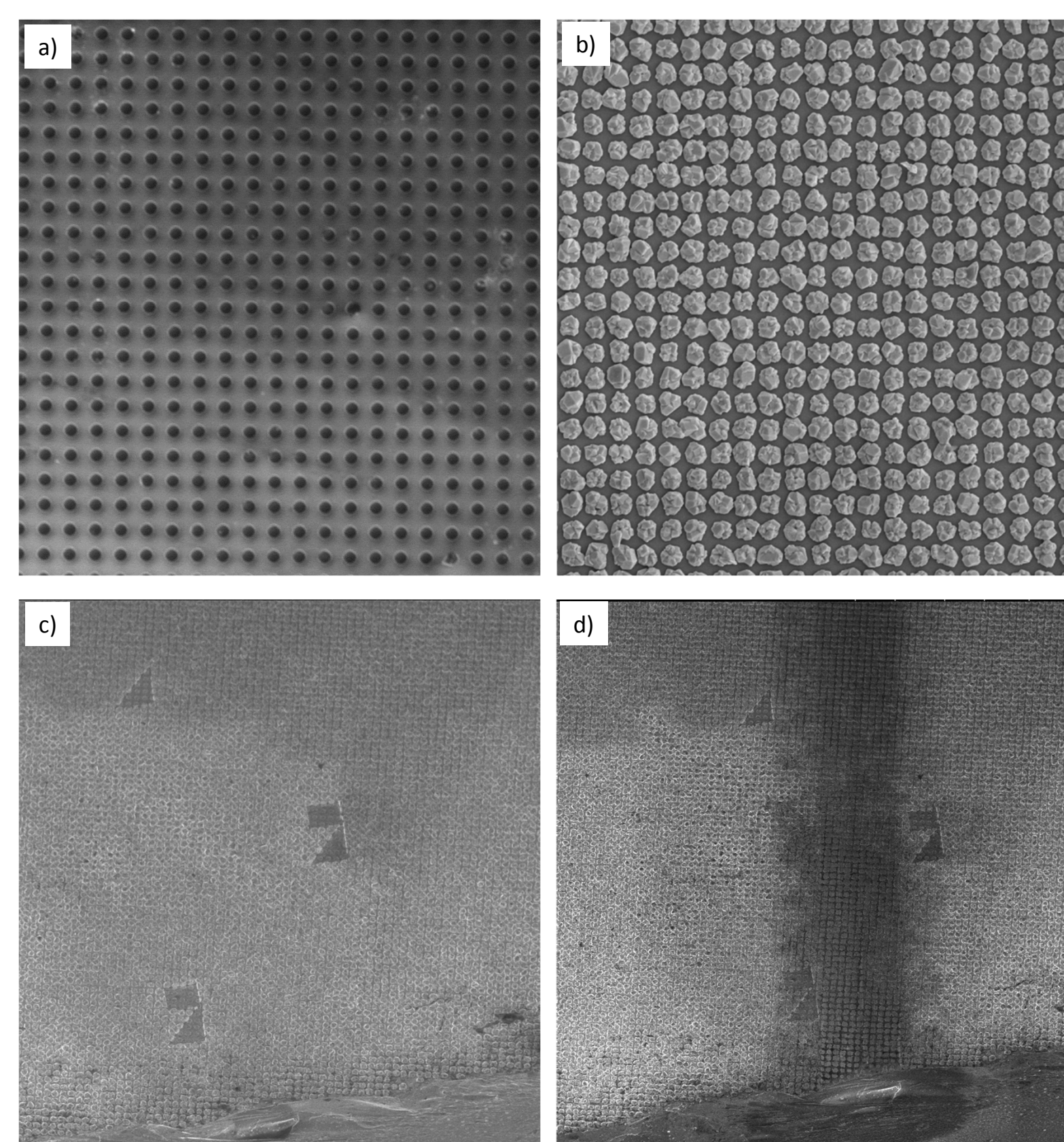
- Develop a fabrication technique to isolate defects in CdTe solar cells.
- Develop a characterization method to make a one-to-one electrical-structural correlation in CdTe solar cells.

## Method



## Fabrication

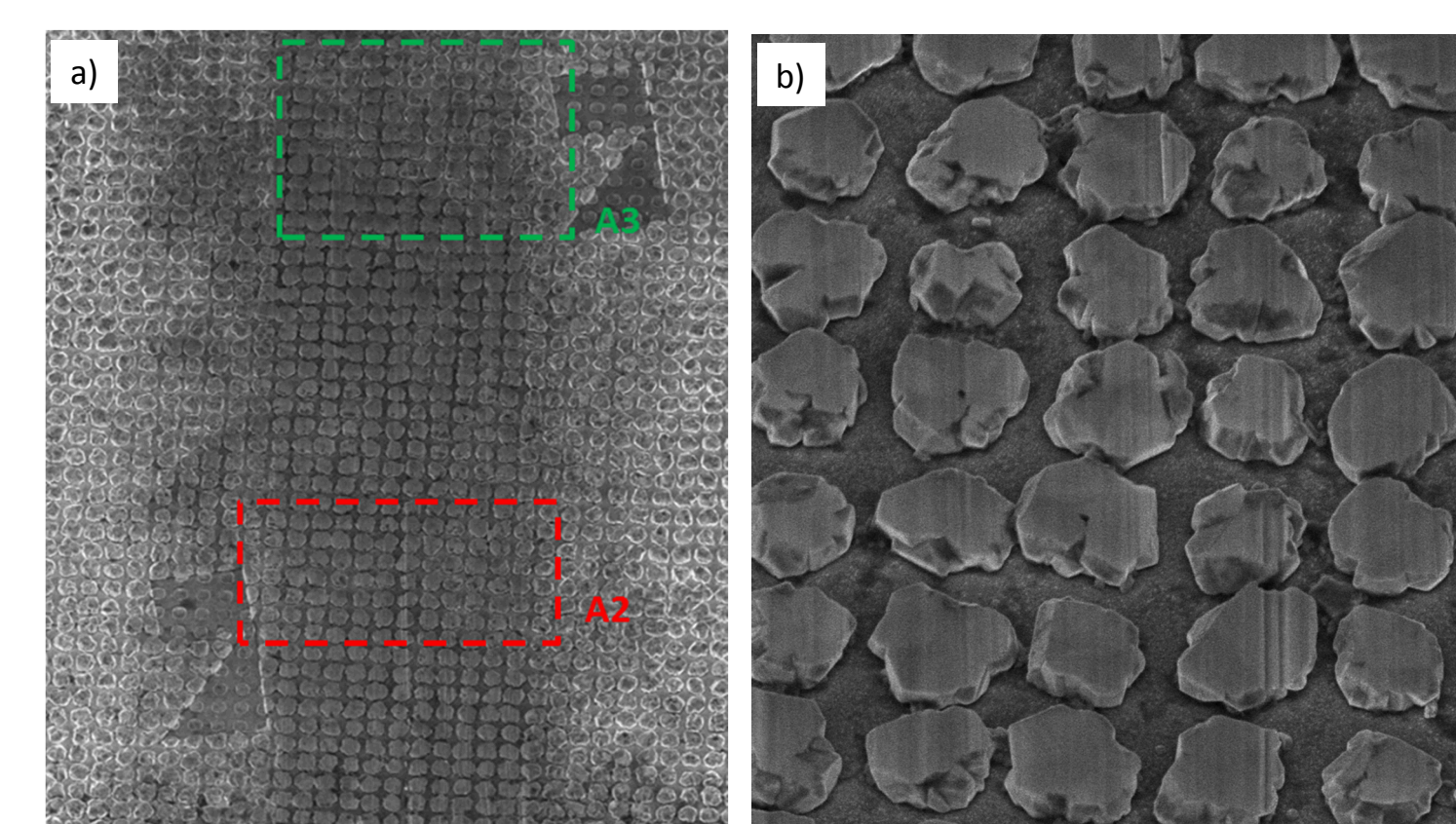
- 2  $\mu\text{m}$ -diameter  $\text{SiO}_2$  windows were fabricated on glass/ITO/CdS substrates
- CdTe was deposited selectively
- A group of micro-pn junctions were indexed, and prepared for EBSD



a) SEM plan view of glass/ITO/CdS/ $\text{SiO}_2$  patterned substrates, b) Selective growth of CdTe on patterned substrates, c) FIB marks for island identification and d) Shaved area between FIBed marks,

## Sample Preparation

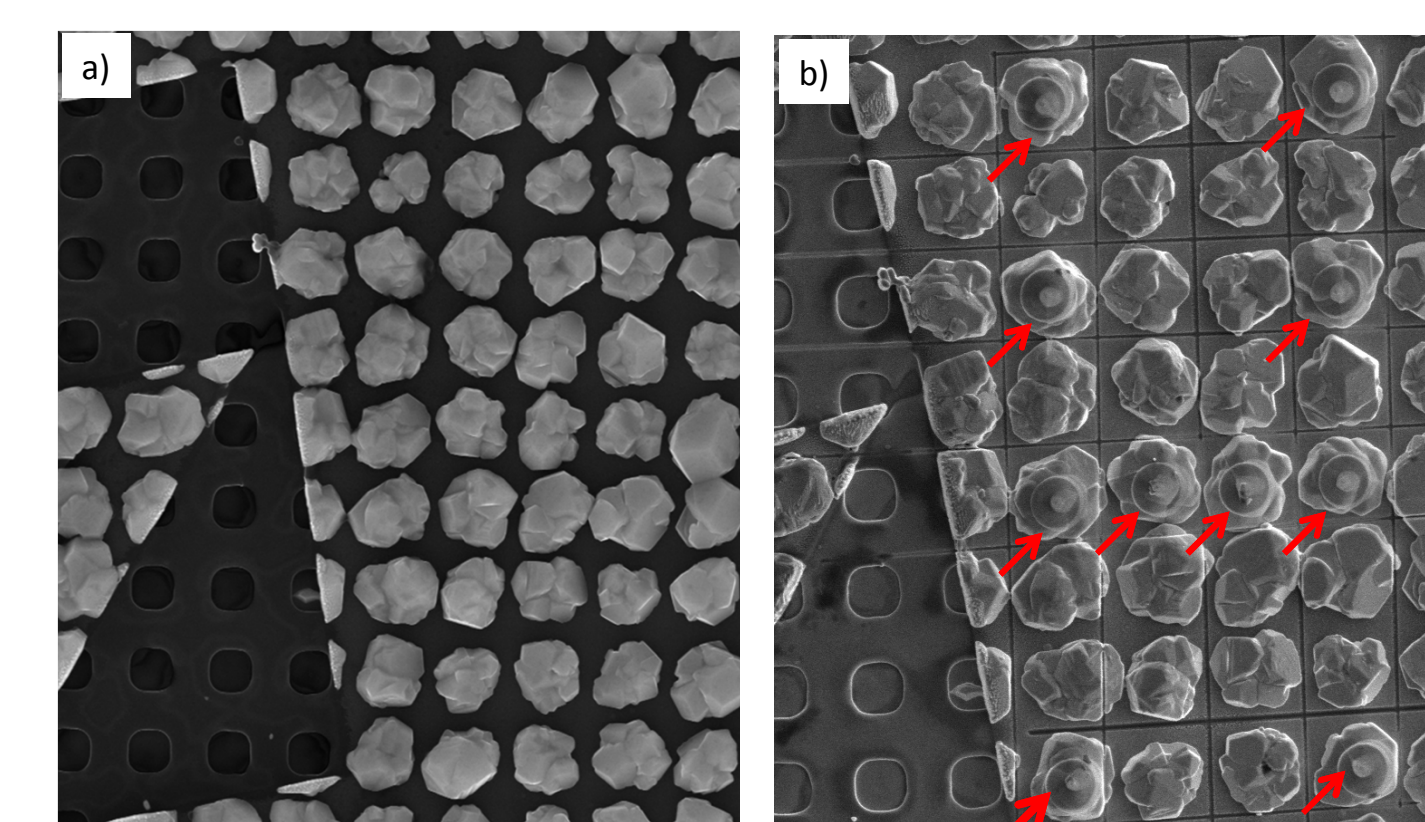
- CdTe islands were shaved using a dual-beam SEM/FIB system
- Sample was mounted parallel to the electron beam and then tilted  $52^\circ$
- A group of micro-pn junctions were indexed, and prepared for EBSD



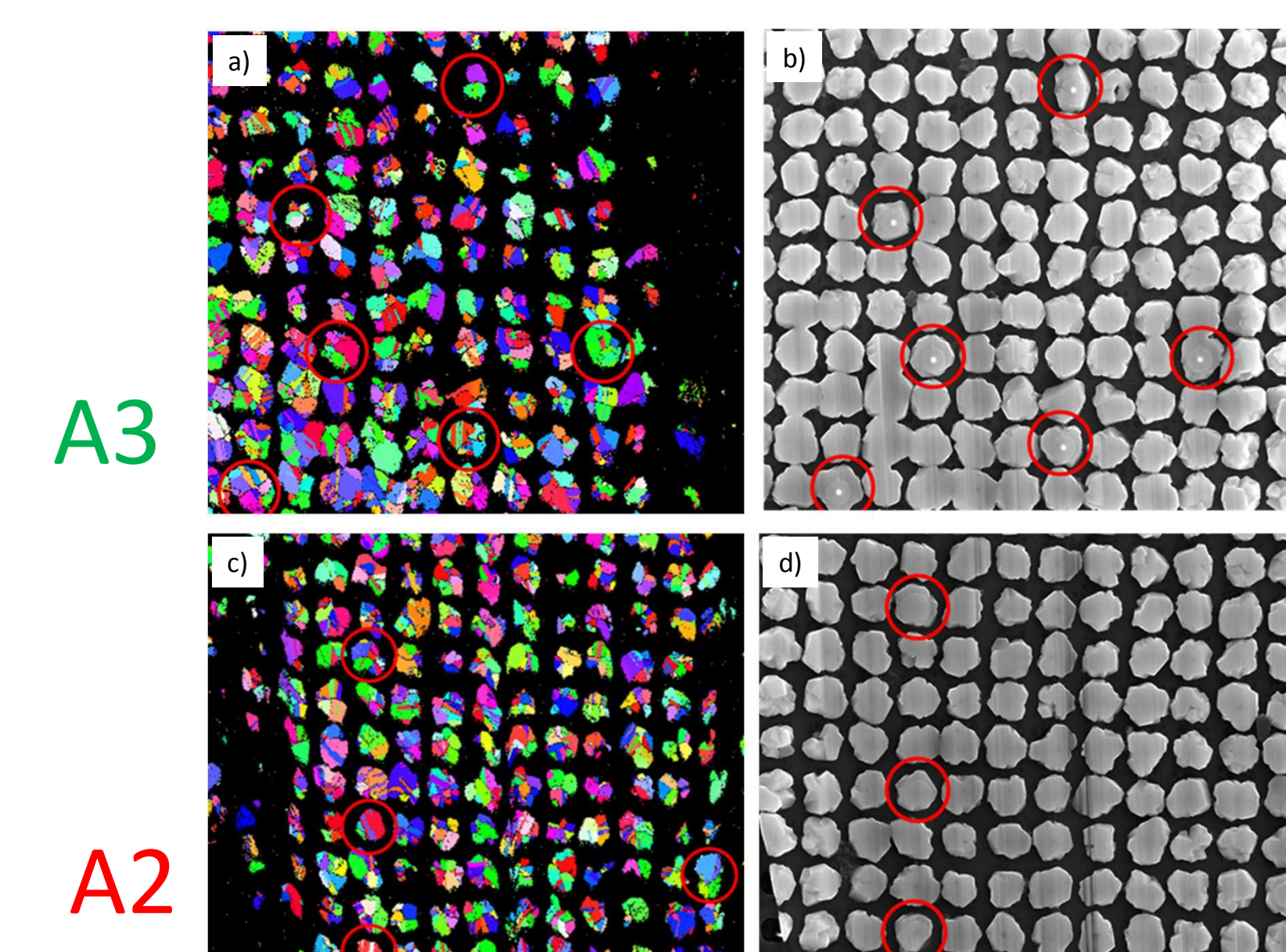
a) FIB marks for island identification, b) Shaved area between FIBed marks, c) Areas of interest for EBSD and d) High magnification plan view of shaved CdTe islands

## Results

- Selective contacts were deposited on CdTe micro-islands
- Grains/island were obtained from EBSD
- Grain orientation/island are known
- Single islands were identified by different characterization tools.



Un-shaved CdTe islands before a) and after b) platinum deposition and FIB isolation



a) EBSD data of shaved CdTe islands. b) Shaved CdTe islands after platinum deposition

## Conclusions

- Selective-area growth was used to isolate CdTe grains and test their atomic structure.
- EBSD was successfully performed and reveals crystallographic orientation.
- Pt was selectively deposited on CdTe islands

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