

Towards Transport Measurements of Topological Crystalline Insulator Core/Shell GaAs/Pb_{1-x}Sn_xTe Nanowires

Sania Dad¹, Rapheal Rosset², Piotr. Dziawa¹, Maciej Wojcik¹, Moira Hocesvar², Krzysztof Dybko¹, Wiktoria Zajkowska-Pietrzak¹, Slawomir Kret¹, Janusz Sadowski^{1,3,4}

¹ Institute of Physics, Polish Academy of Sciences, Aleja Lotnikow 32/46, 02-668 Warsaw, Poland

² Univ. Grenoble Alpes, CNRS, Grenoble INP, Institut Néel, F-38000 Grenoble, France

³Ensemble3 Centre of Excellence, Wólczyńska 133, Warsaw, Poland

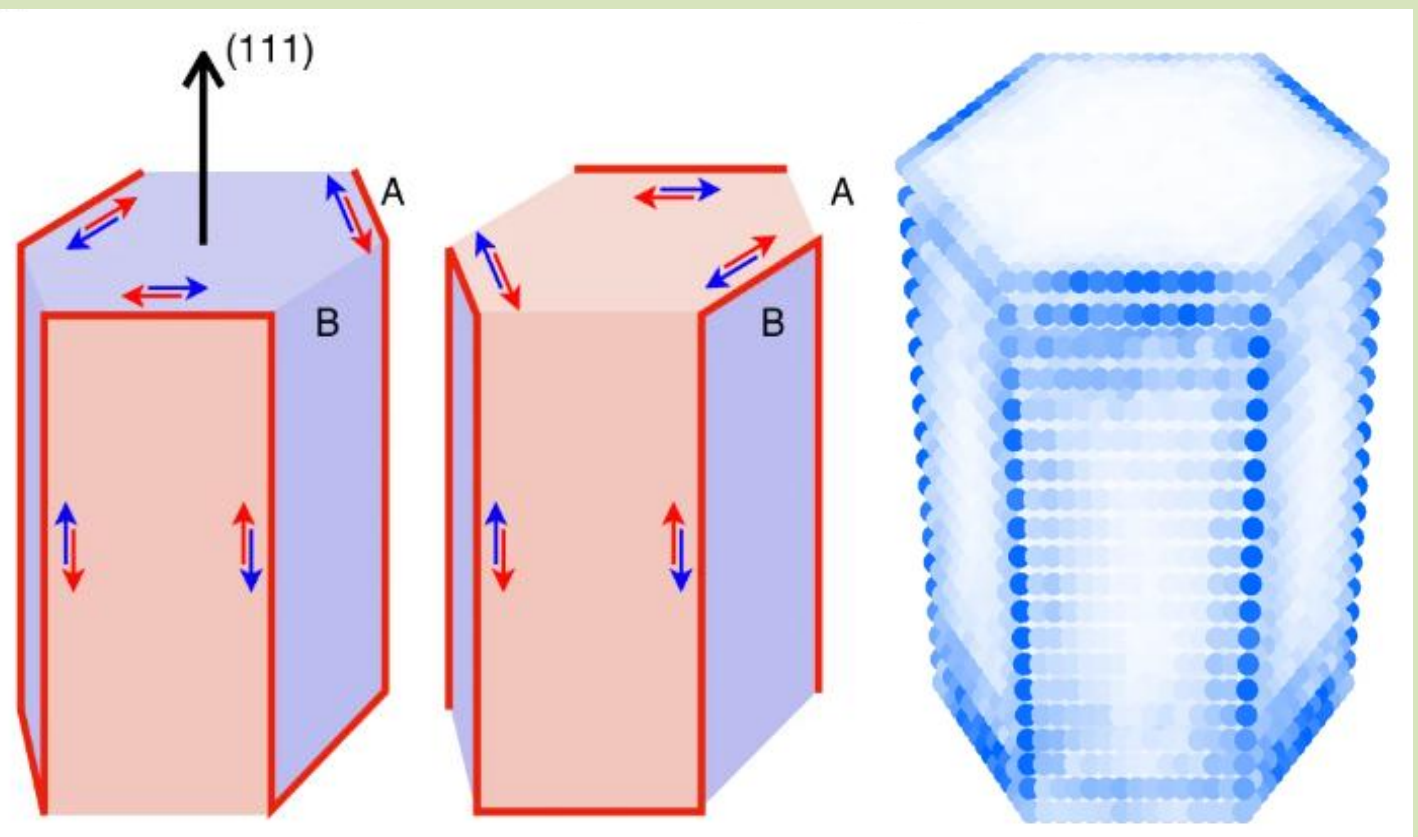
⁴Faculty of Physics, University of Warsaw, Pasteura 5, 02-093 Warsaw, Poland



Objectives

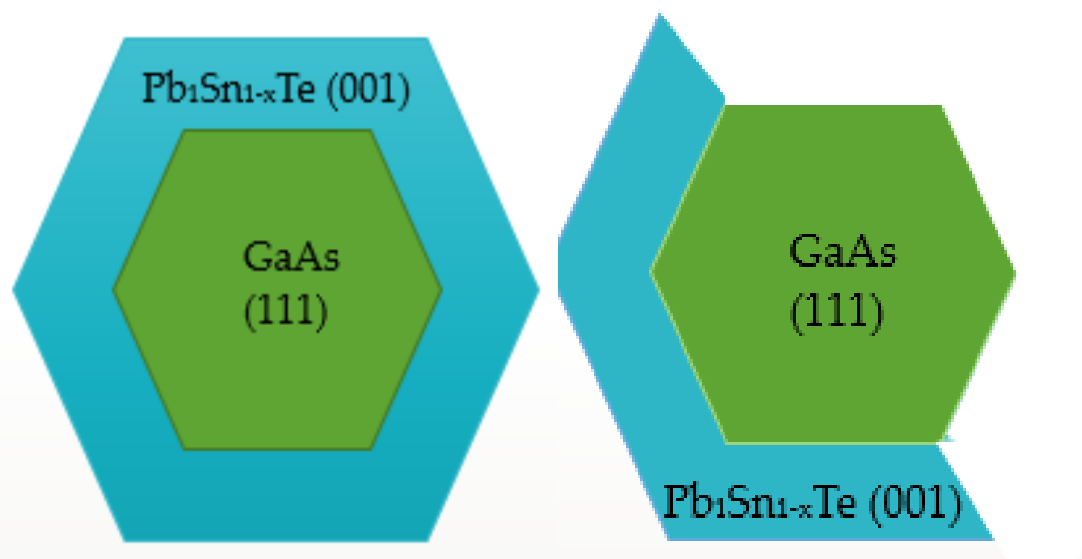
TCI hinge states as well as (110) surface states

HOTI (High Ordered Topological Insulator states)



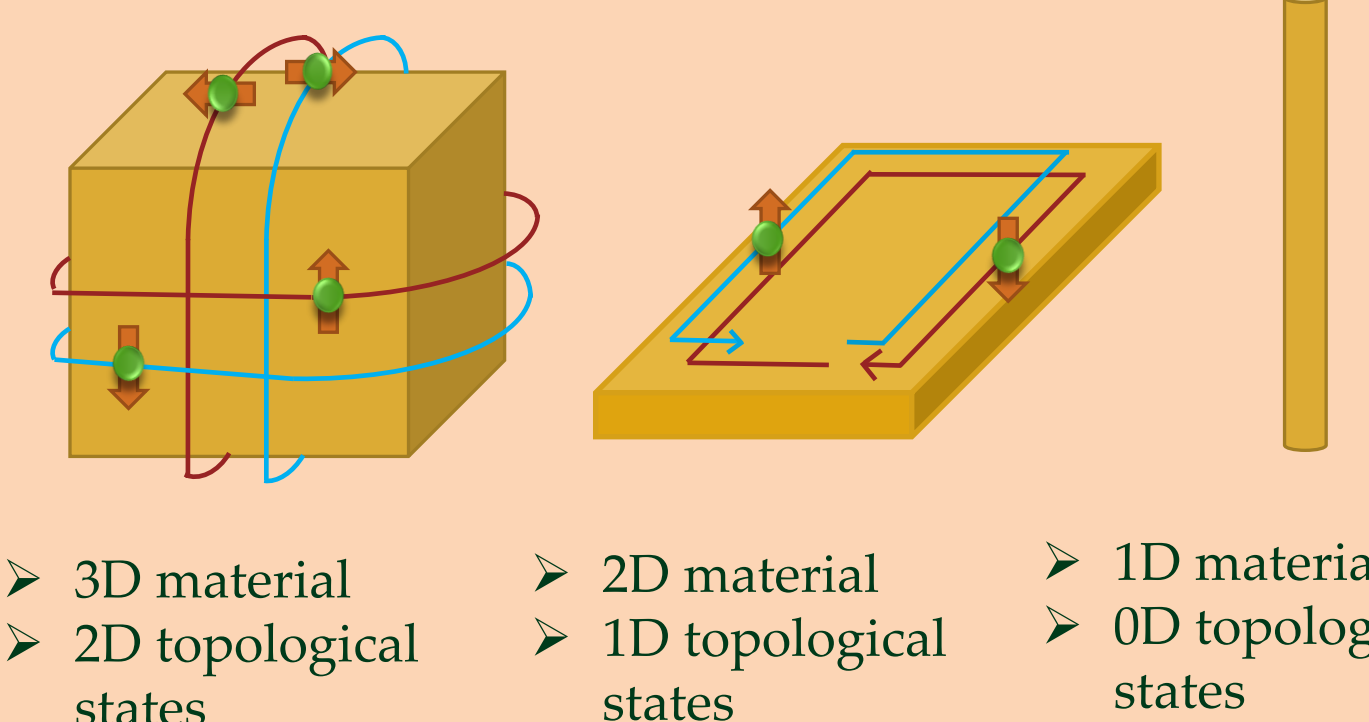
Frank Schindler, Zhijun Wang and Titus Neupert Nat. Phys. 14, 918 (2018)

IV-VI on III-V

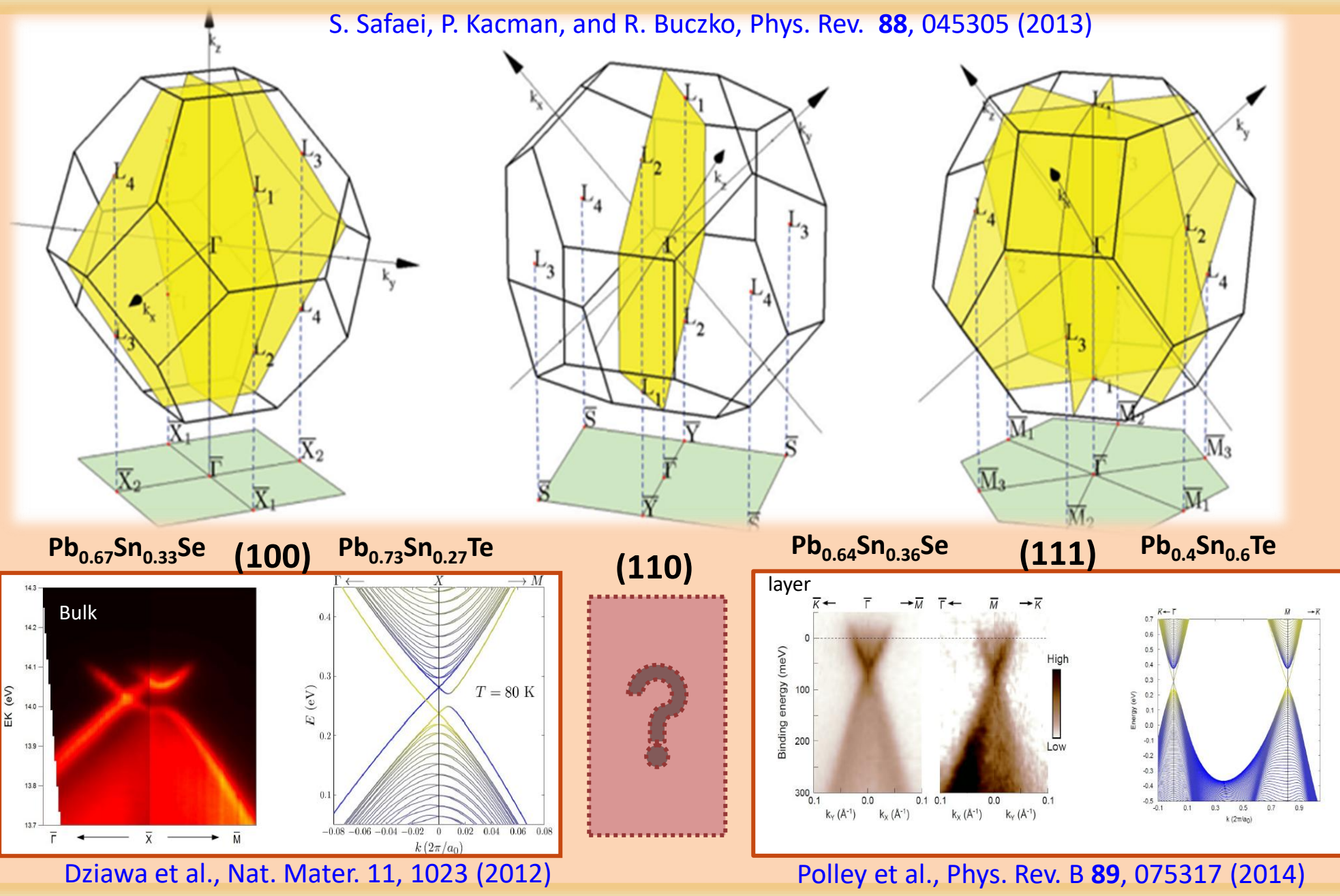


Introduction

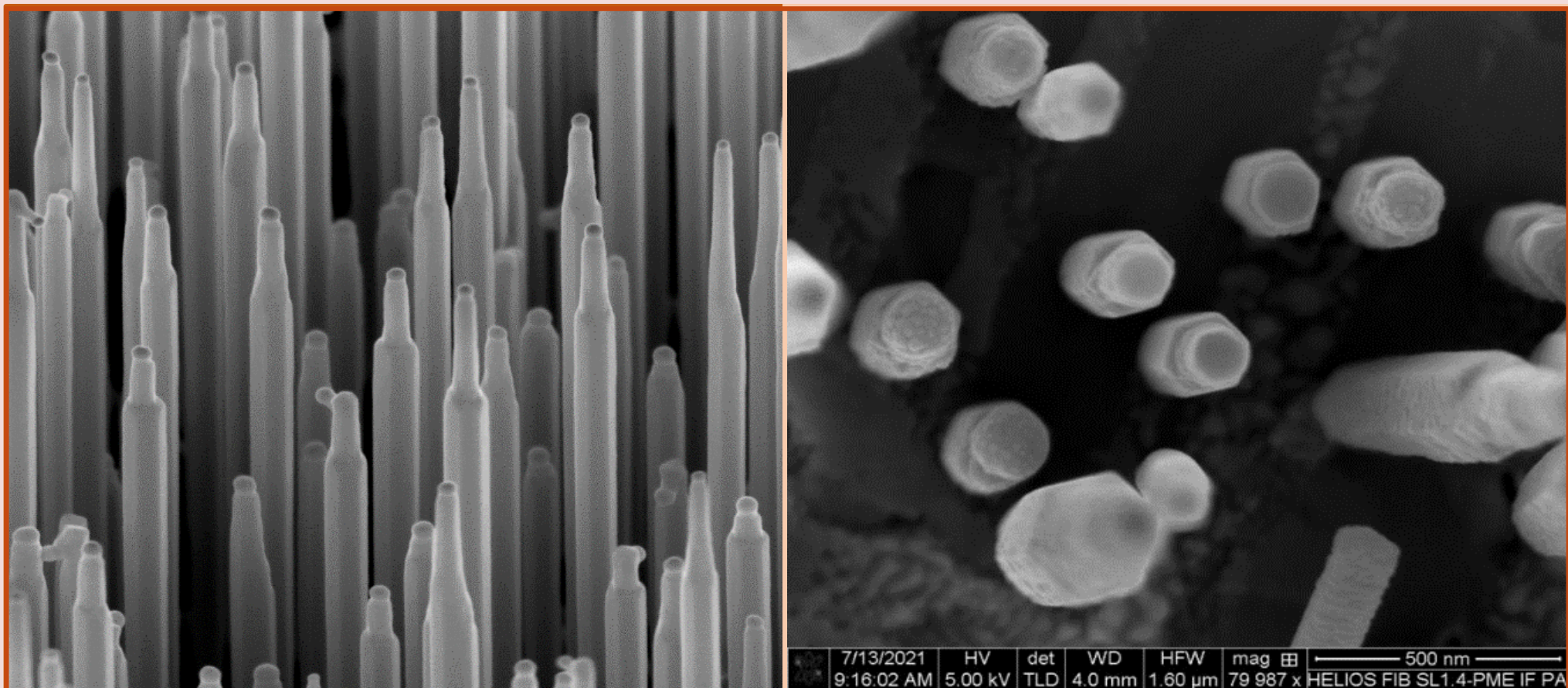
TCI States



- 3D material
- 2D topological states
- 2D material
- 1D topological states
- 1D material
- 0D topological states

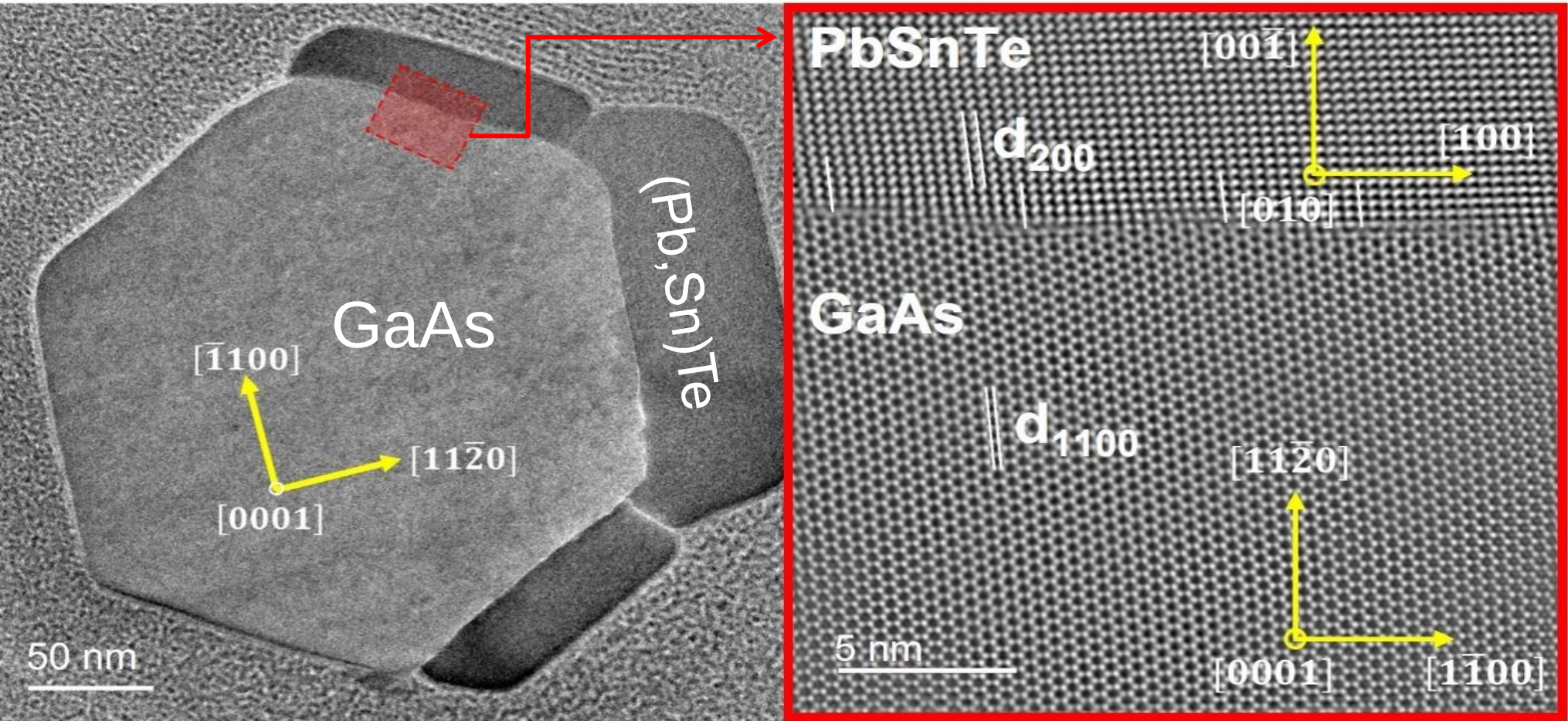


Structural studies of NWs



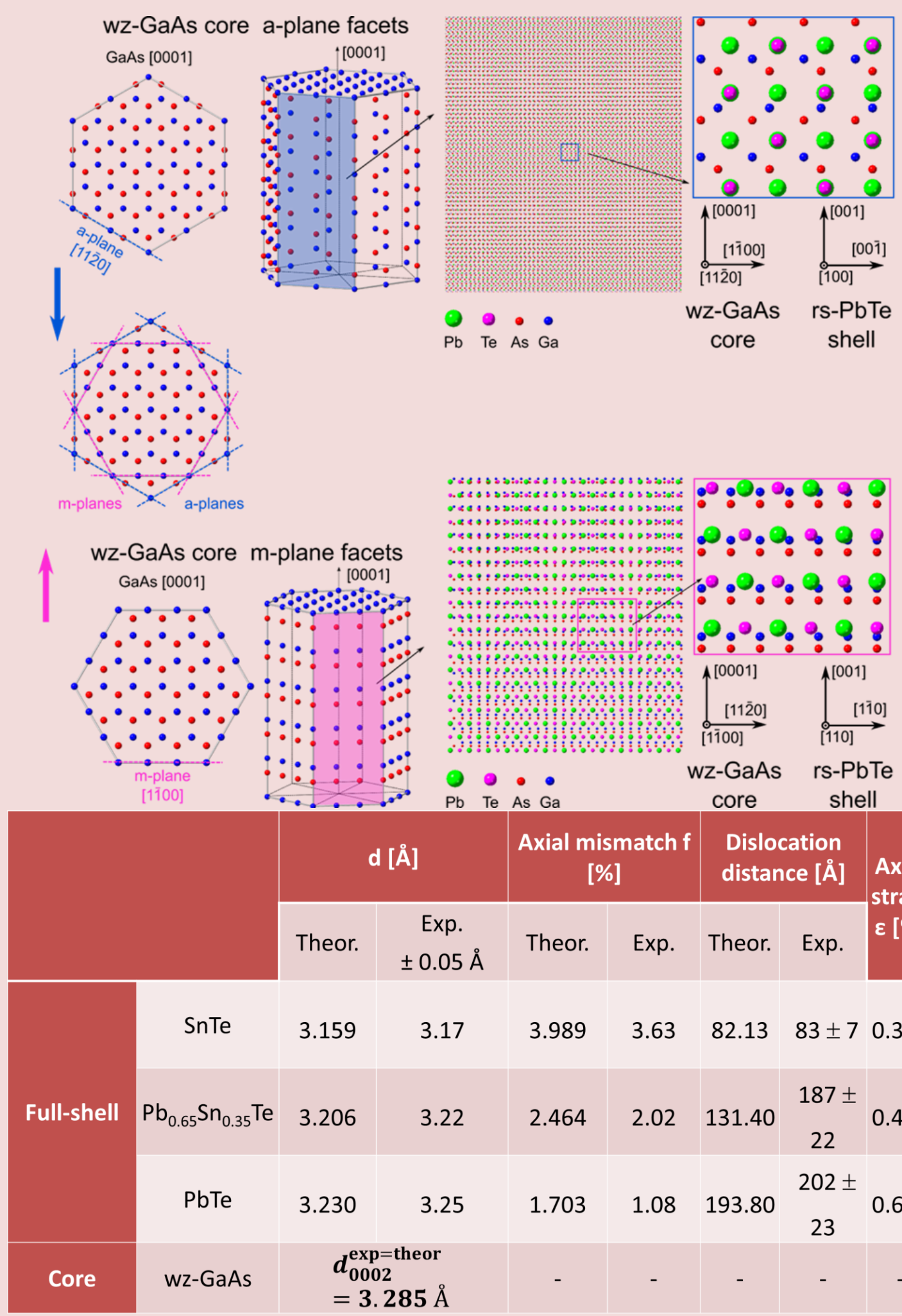
Pristine GaAs Nanowires

(Pb,Sn)Te/GaAs full-shell NWs (side view)

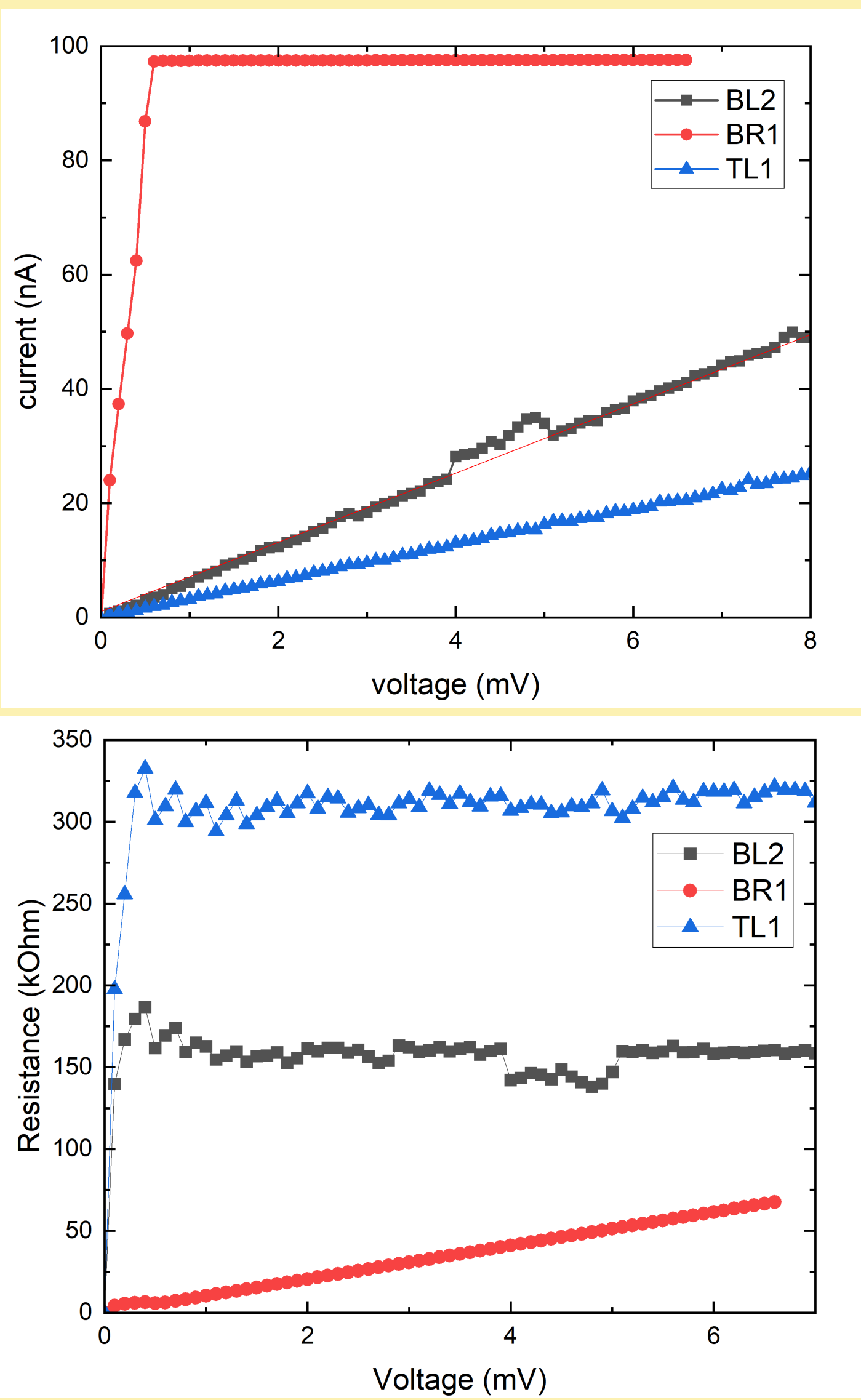
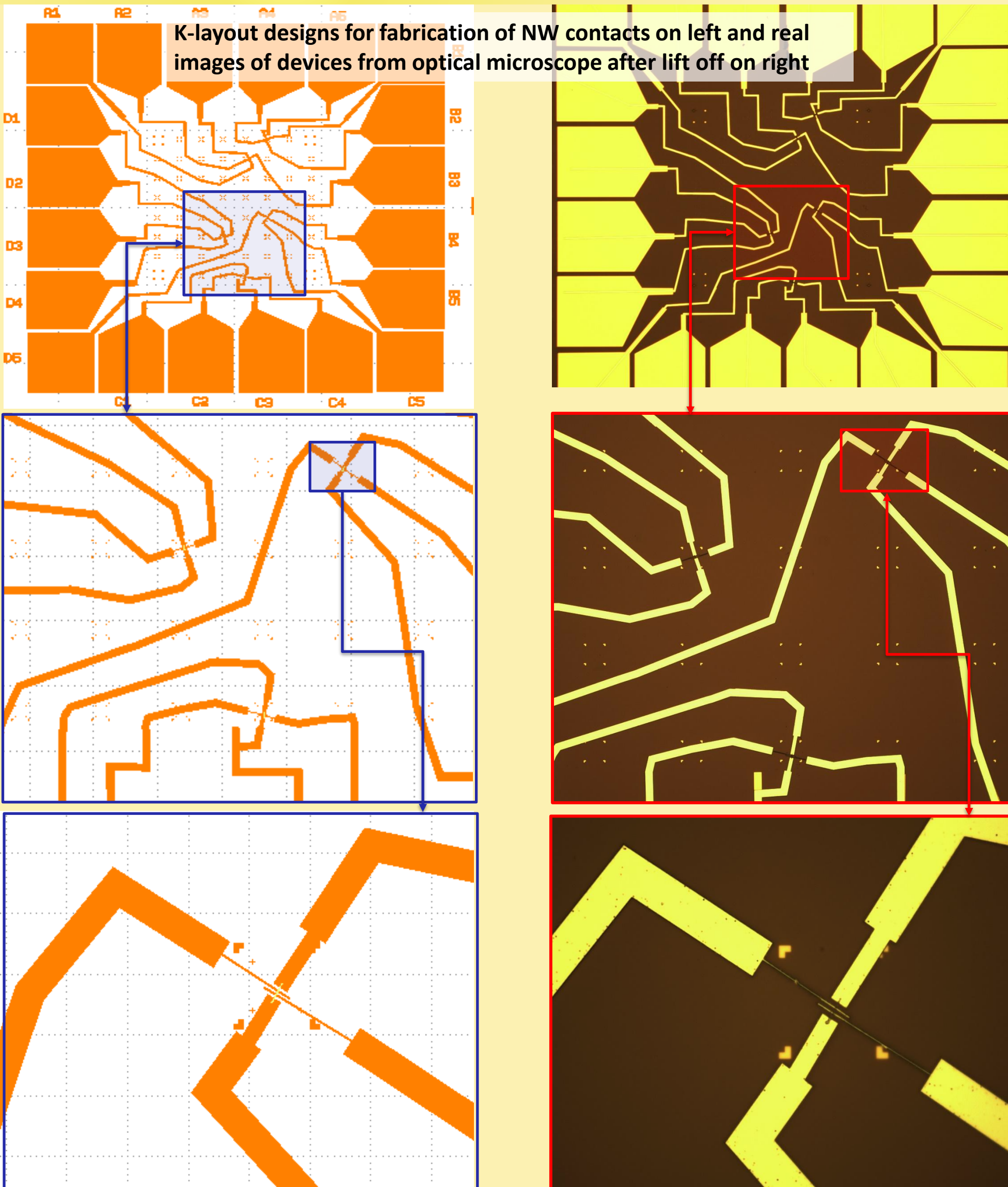
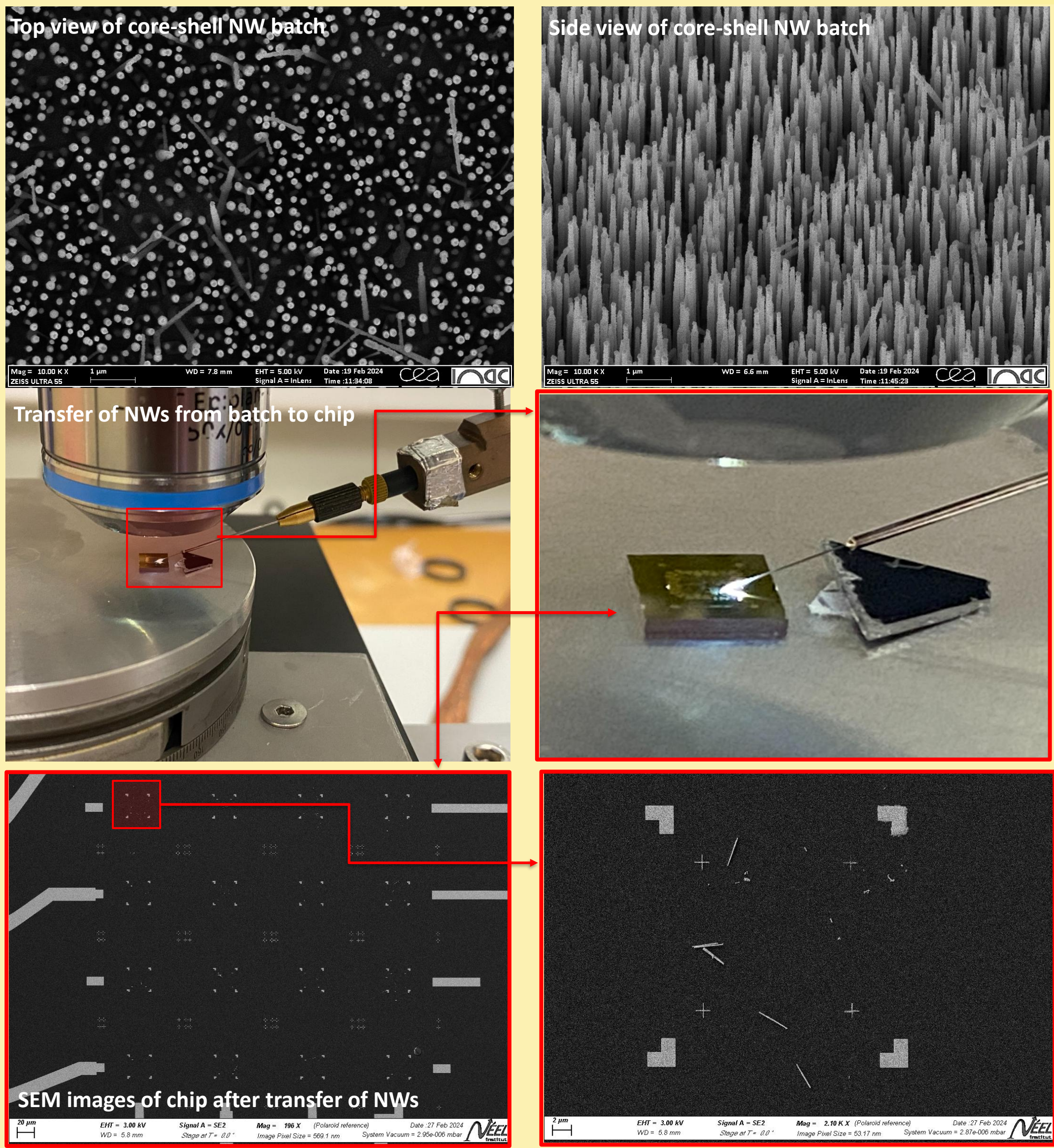


Cross-sectional Image of half-shell Nanowire

HR-TEM image of single PbTe/GaAs full-shell NWs



Fabrication of NW devices and I-V characteristics

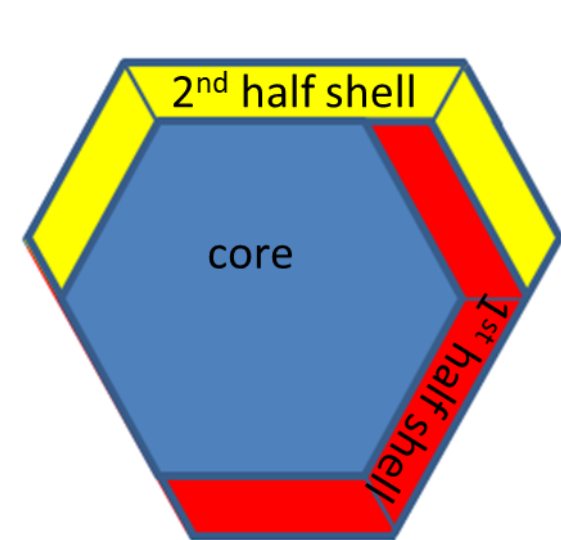


Conclusions

- ❖ Pb_{1-x}Sn_xTe can be grown as full and half shells of III-V (GaAs) nanowires in a full composition range
- ❖ IV-VI shells are constituted from {100} or {110} surfaces (with topological protection)
- ❖ Possibility to control the topological transition by strain
- ❖ The ohmic contacts to individual NWs have been fabricated by e-beam lithography and Au deposition.
- ❖ The best samples exhibit low resistivities

Future plans

- ❖ To obtain completely smooth and unbroken Pb_{1-x}Sn_xTe shells on GaAs NWs
- ❖ Magnetotransport measurements of individual NW devices
- ❖ To grow a second half shell on the chosen sidewalls of NWs
- ❖ A way to study TCI hinge states as well as (110) surface states of TCI



Details

Please scan me for more details ☺



Acknowledgements

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