



# 2019「中技社科技獎學金」

2019 CTCI Foundation Science and Technology Scholarship

## 境外生研究獎學金

Research Scholarship for International Graduate Students

### Development of Novel Metal Oxide Transporting Layer for Efficient and Stable Perovskite Solar Cells



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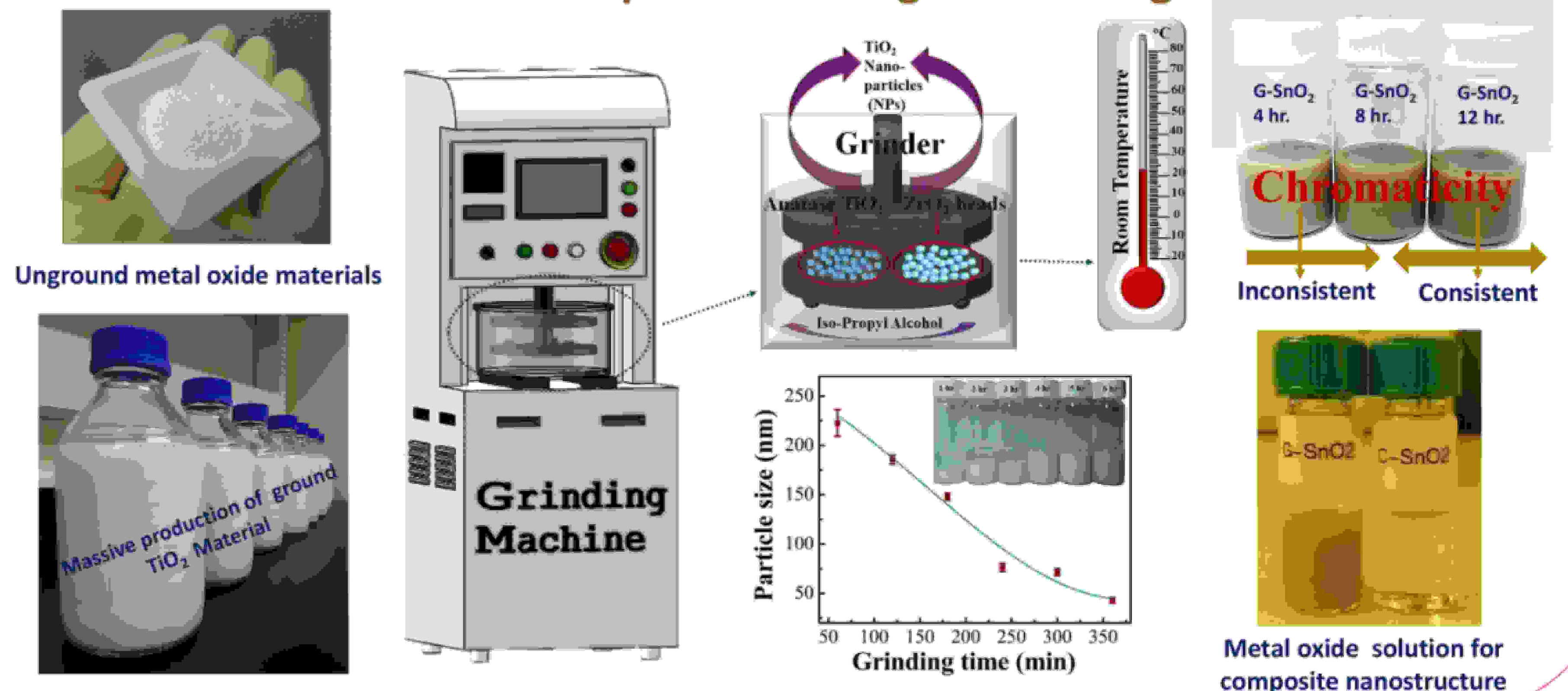
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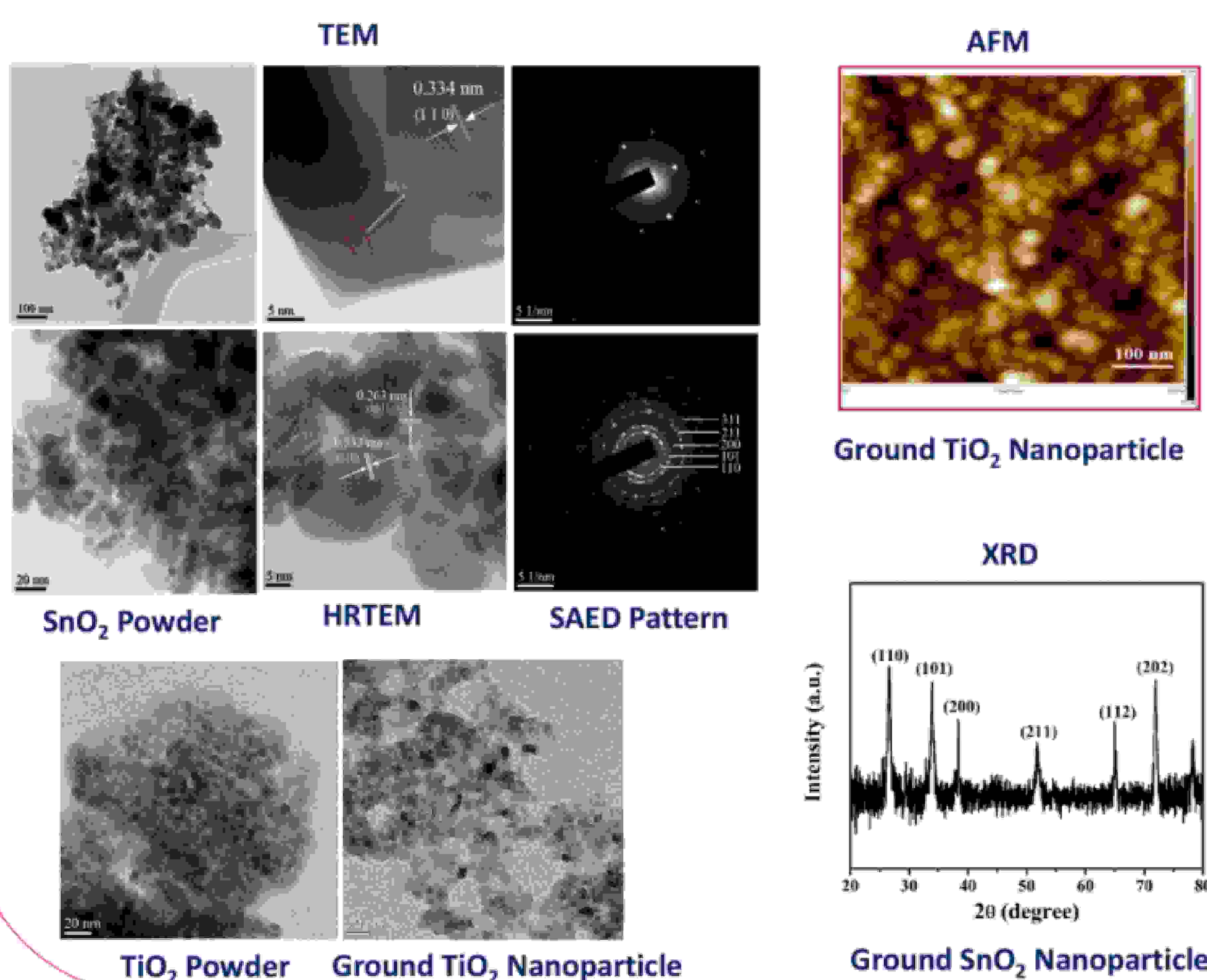
#### Abstract

My research focuses on the development of novel metal oxide transporting layer for hybrid perovskite solar cell (PSCs) application. Our studies have led to a low cost, low-temperature mechanical approach to form functional metal oxides nanostructures, and apply them in solar cell, has the great technical potential for stable, high efficiency and low-cost solar cells and modules. To speed up the transition of PSCs from laboratory stage to the large-scale industrial productions, the issue of device stability while maintaining his good efficiency is at the top priority needed to be overcome. Metal oxide charge transporting layer based PSCs have potential to be get rid of the issue to commercialization for next-generation solar cells.

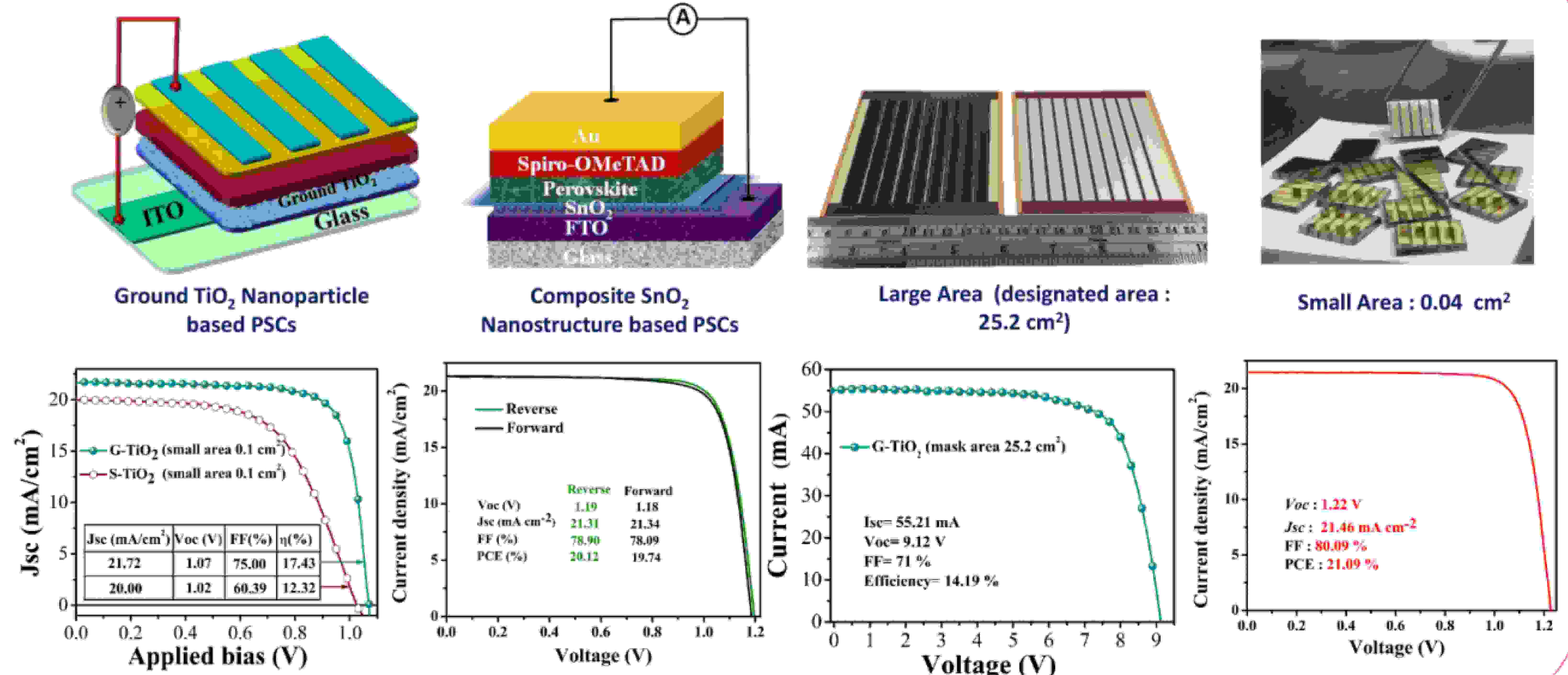
#### Materials Preparation through Ball-Milling



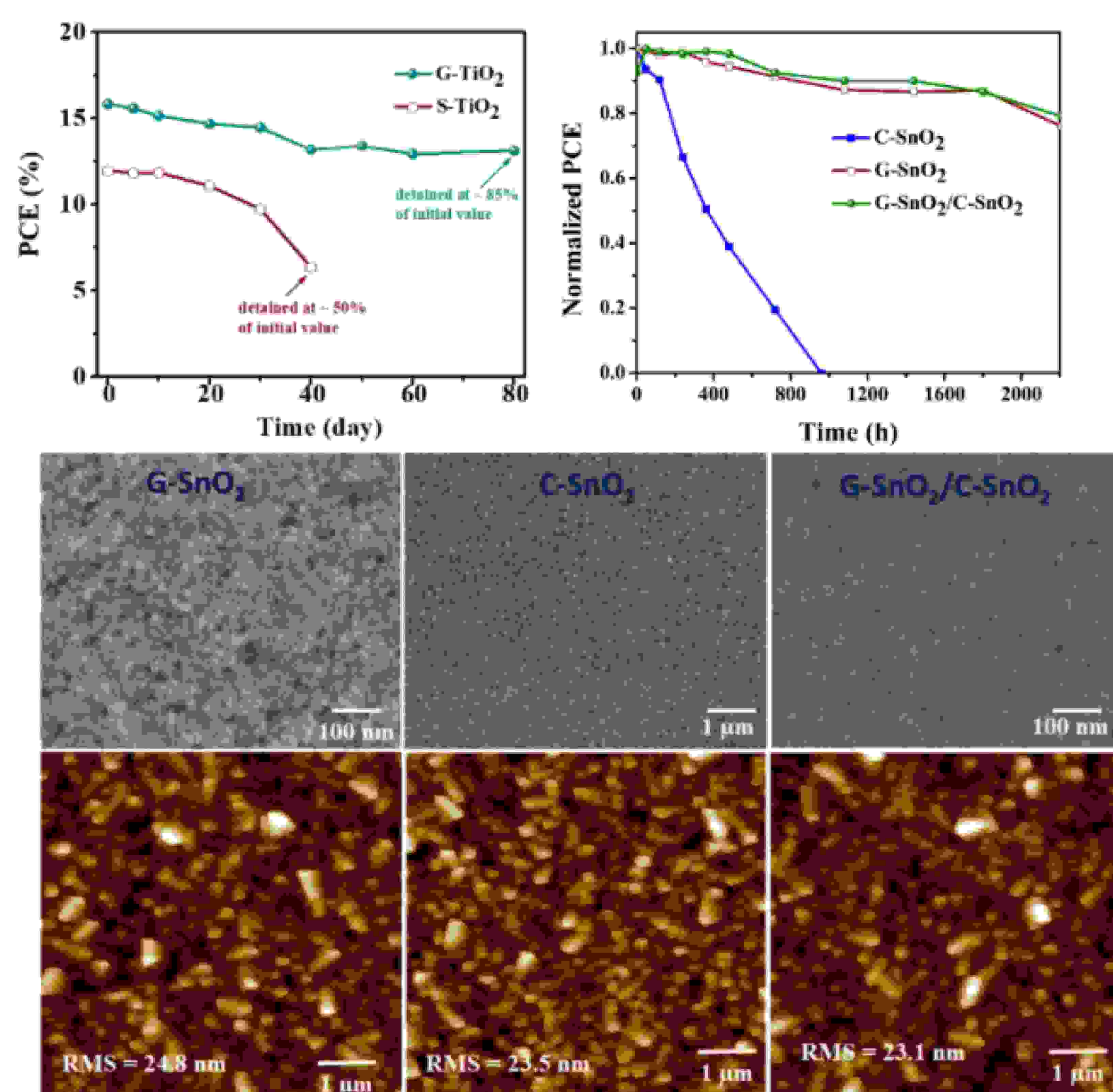
#### Crystallographic and Particle Size



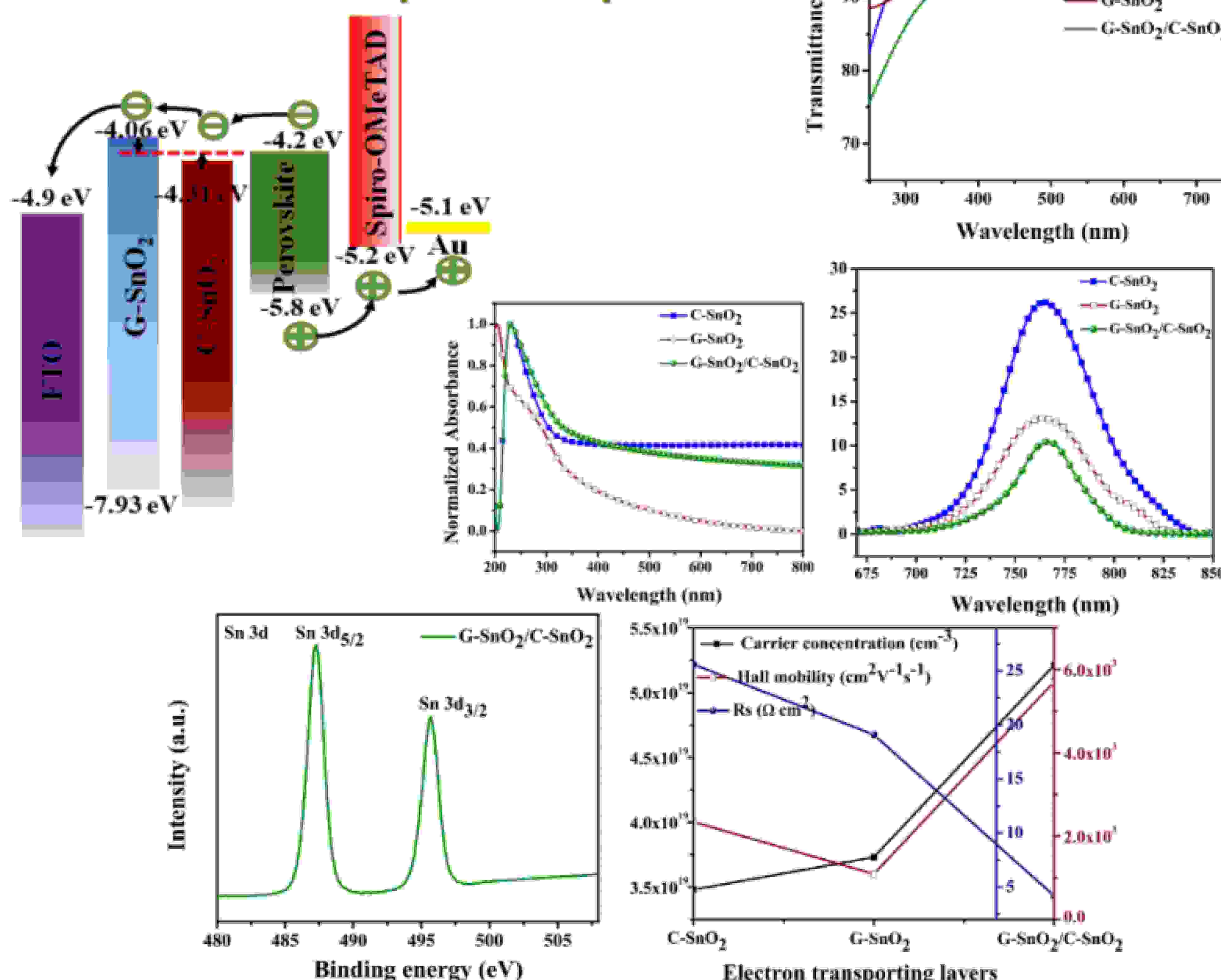
#### Device Architecture and Device Performances



#### Device Stability and Surface Morphology

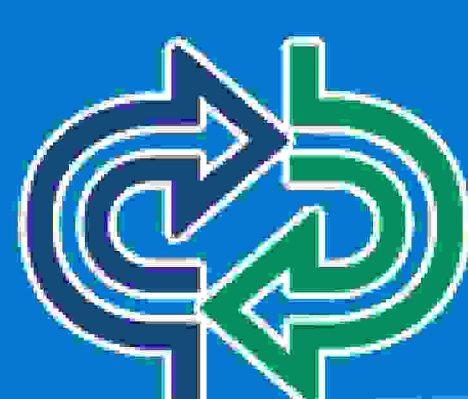


#### Interface, Surface, Charge Transport, Electrical and Optical Properties



#### Selected Journal Publications:

- Mriganka Singh, Chien-Hung Chiang, Karunakara Moorthy Boopathi, Chintam Hanmandlu, Gang Li, Chun-Guey Wu\*, Hong-Cheu Lin\*, and Chih-Wei Chu\*, "A Novel Ball Milling Technique for Room Temperature Processing of TiO<sub>2</sub> Nanoparticles employed as the Electron Transporting Layer in Perovskite Solar Cells and Modules" *Journal of Materials Chemistry A* (2018) 6, 7114-7122.
- Mriganka Singh, Annie Ng, Zhiwei Ren, Hanlin Hu, Hong-Cheu Lin, Chih-Wei Chu, Gang Li, "Facile Synthesis of Composite Tin Oxide Nanostructures for High-Performance Planar Perovskite Solar Cells" *Nano Energy* (2019) 60, 275-284.



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