COLLEGE OF ENGINEERING
THE UNIVERSITY OF ALABAMA IN HUNTSVILLE

Research Horizons Day & Research Week March 16-20, 2020

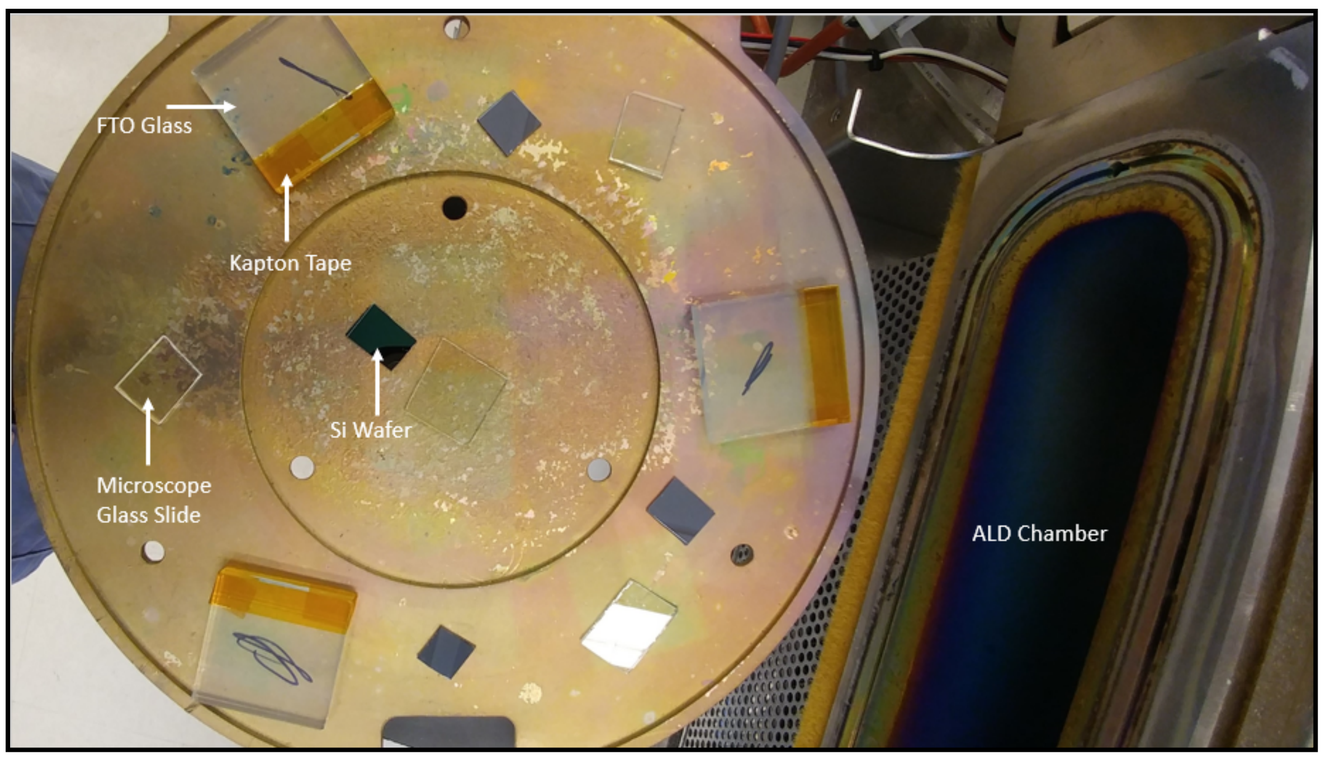
Research Horizons Day

Fabrication of Perovskite Solar Cells at UAH

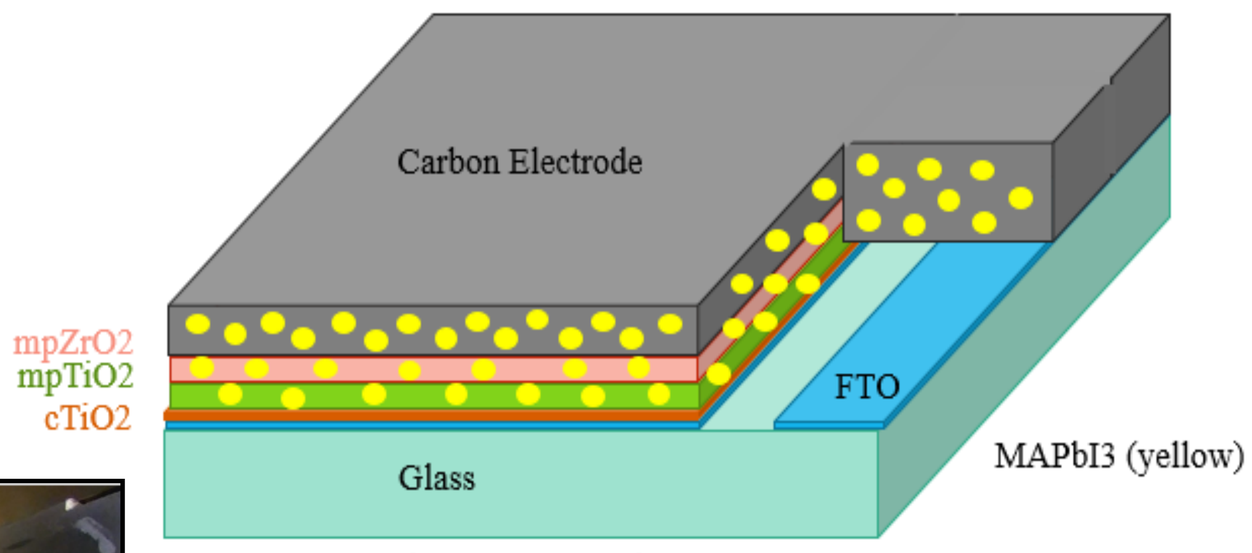
Natalie Mann, Mechanical and Aerospace Engineering
Dr. Yu Lei, Chemical and Materials Engineering

Overview

The neoteric field of perovskite solar cell research shows great promise for high-efficiency, low cost devices. This research defined a method for fabricating perovskite solar cells on UAH's campus, with an emphasis on inkjet printability. The final step in this research is forming the perovskite crystal in a glovebag.



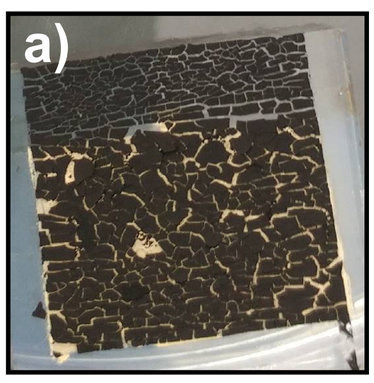
Loading of FTO glass, Si wafers, and glass into ALD system



Schematic of solar cell design

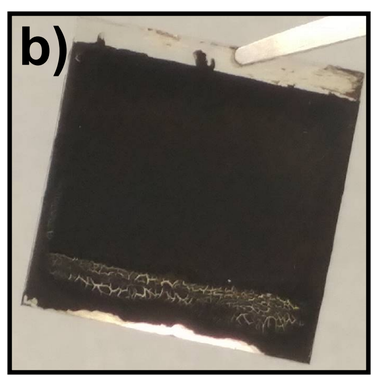
Key Findings

- X-ray powder diffraction patterns were obtained for multiple chemicals and multiple trials.
- Adhesion of the carbon slurry to portions of the solar cell was achieved.
- The model for TiO_2 on Si wafer matches experimental data.
- Baseline recipes for slurries have been obtained.



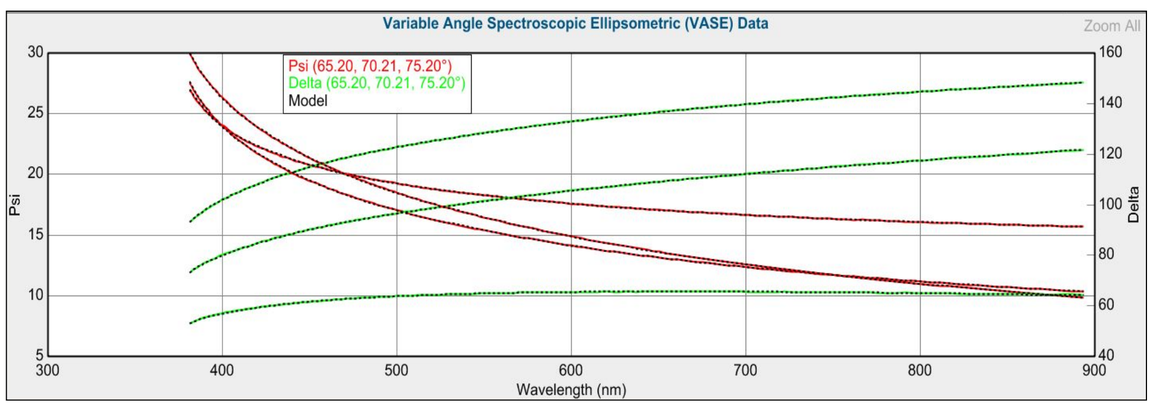
a) Poor carbon adhesion

b) Improved carbon adhesion

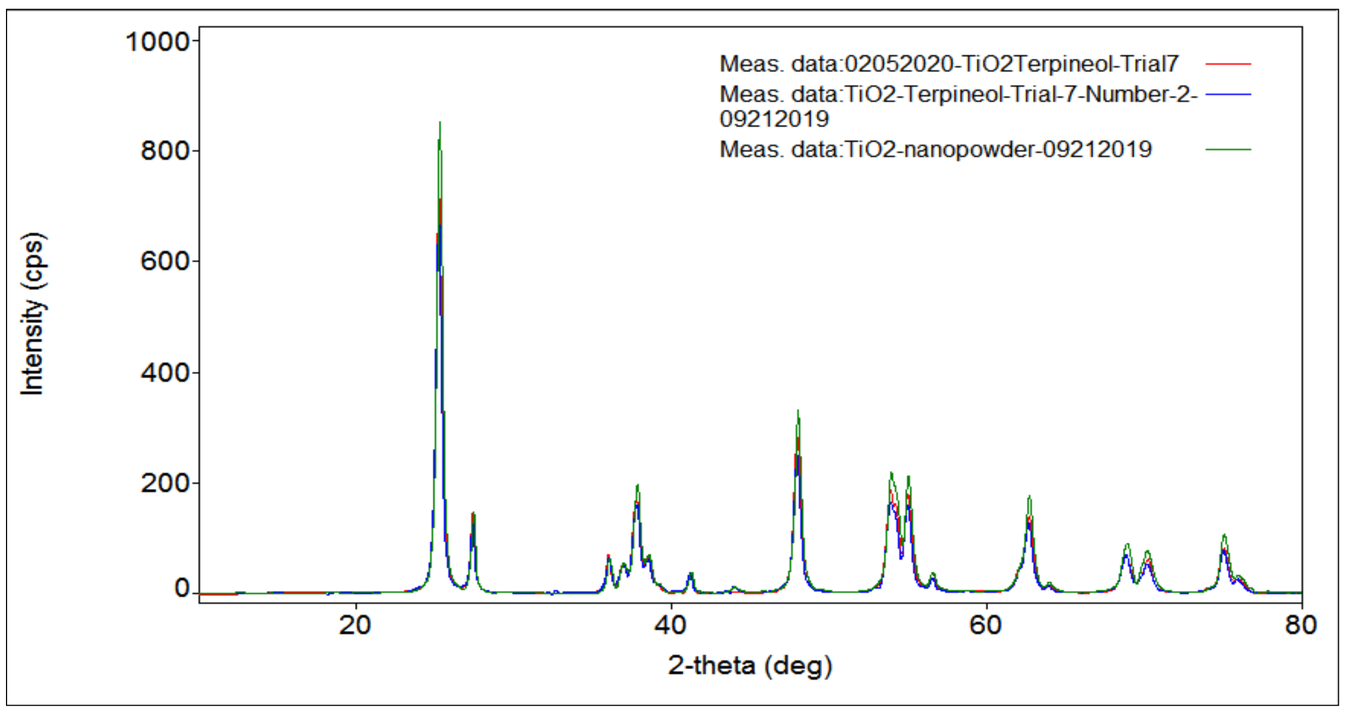


Explanation/Impact

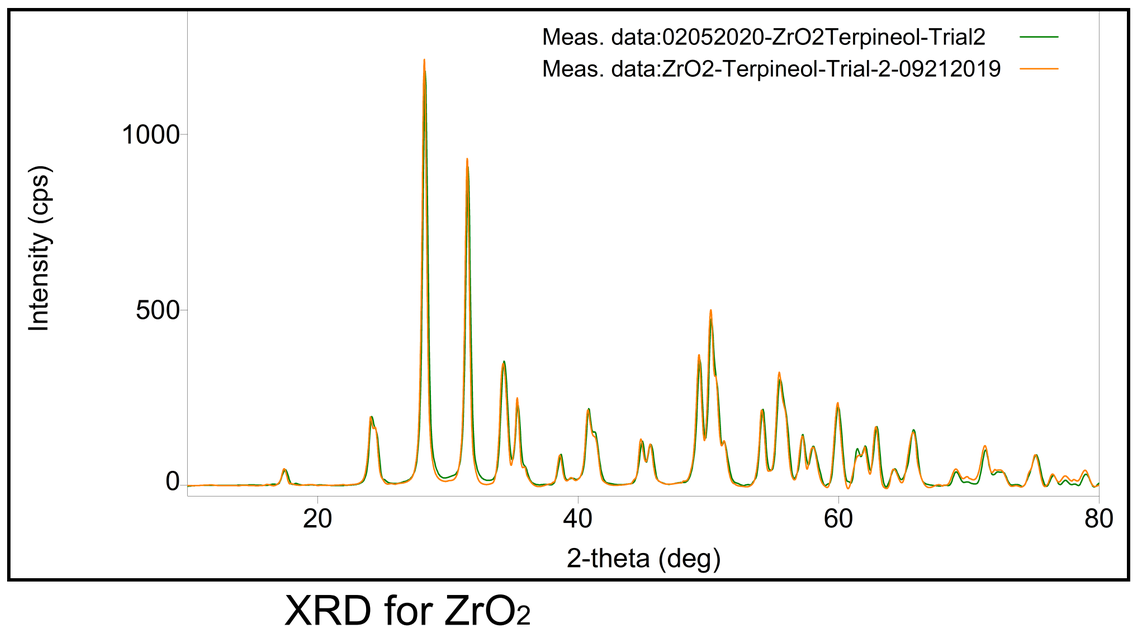
- The carbon slurry has improved adhesion when the solvent is evaporated slowly for extended time.
- Annealed TiO_2 slurry and virgin TiO_2 powder XRD patterns match very well.
- Ellipsometry results help quantify TiO_2 films formed via ALD.
- Printing technology would greatly reduce the manufacturing costs and make solar modules ubiquitous.
- This research defined a new project on UAH's campus and serves as an educational platform for promoting green energy on campus and in the community.



Ellipsometry, experimental data vs model



XRD for TiO_2



XRD for ZrO_2

Acknowledgements

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