

Electrodeposited Cu₂O Heterojunction Solar Cells

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Motivation

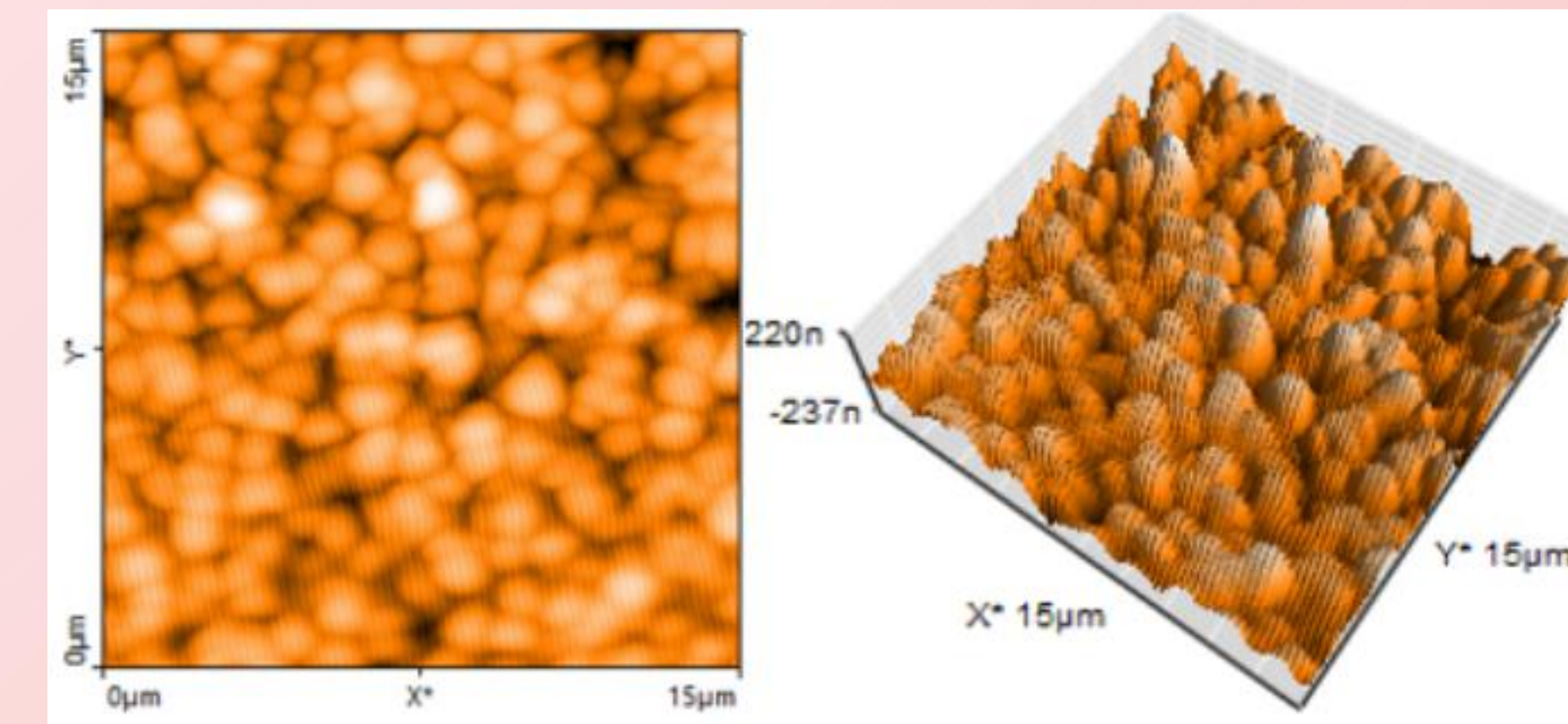
Why metal-oxide solar cells:

- Solar energy is the main source of renewable energy, along with biomass, wind and hydro made up 11.7% of total electric generation.
- Traditional Si solar cells are relative expensive, an alterative light absorb material is required to increase the cost efficiency.
- Metal oxide based solar cells are easy to fabricate and low cost, with high theoretical solar efficiency.

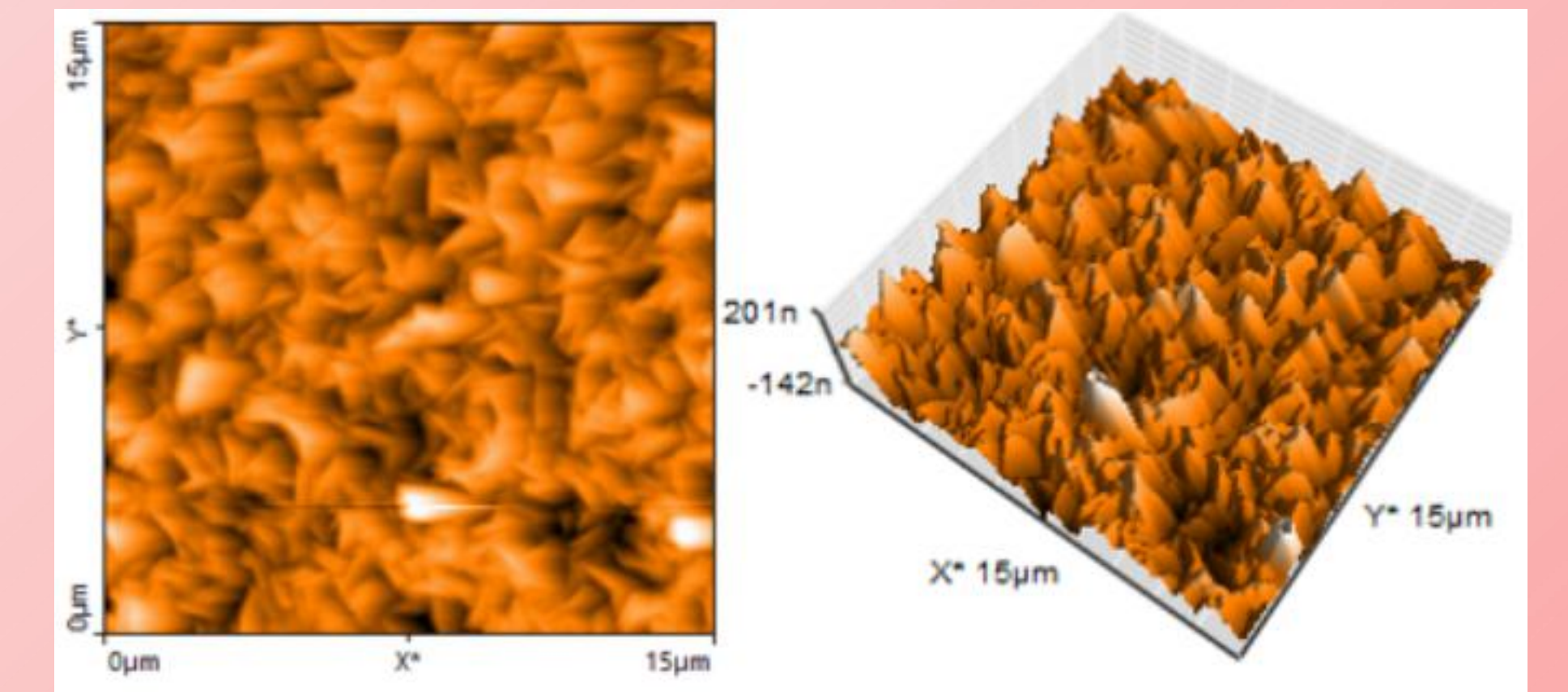
Why Cu₂O:

- Nontoxic material and abundance exist on earth.
- Capable of large scale synthesis with low cost controllable process.
- Band gap of Cu₂O is around 2.17eV, suitable to absorb visible spectrum.
- This study is focused on synthesis of Cu₂O film by electrochemical deposition and demonstrating Cu₂O based solar cell.

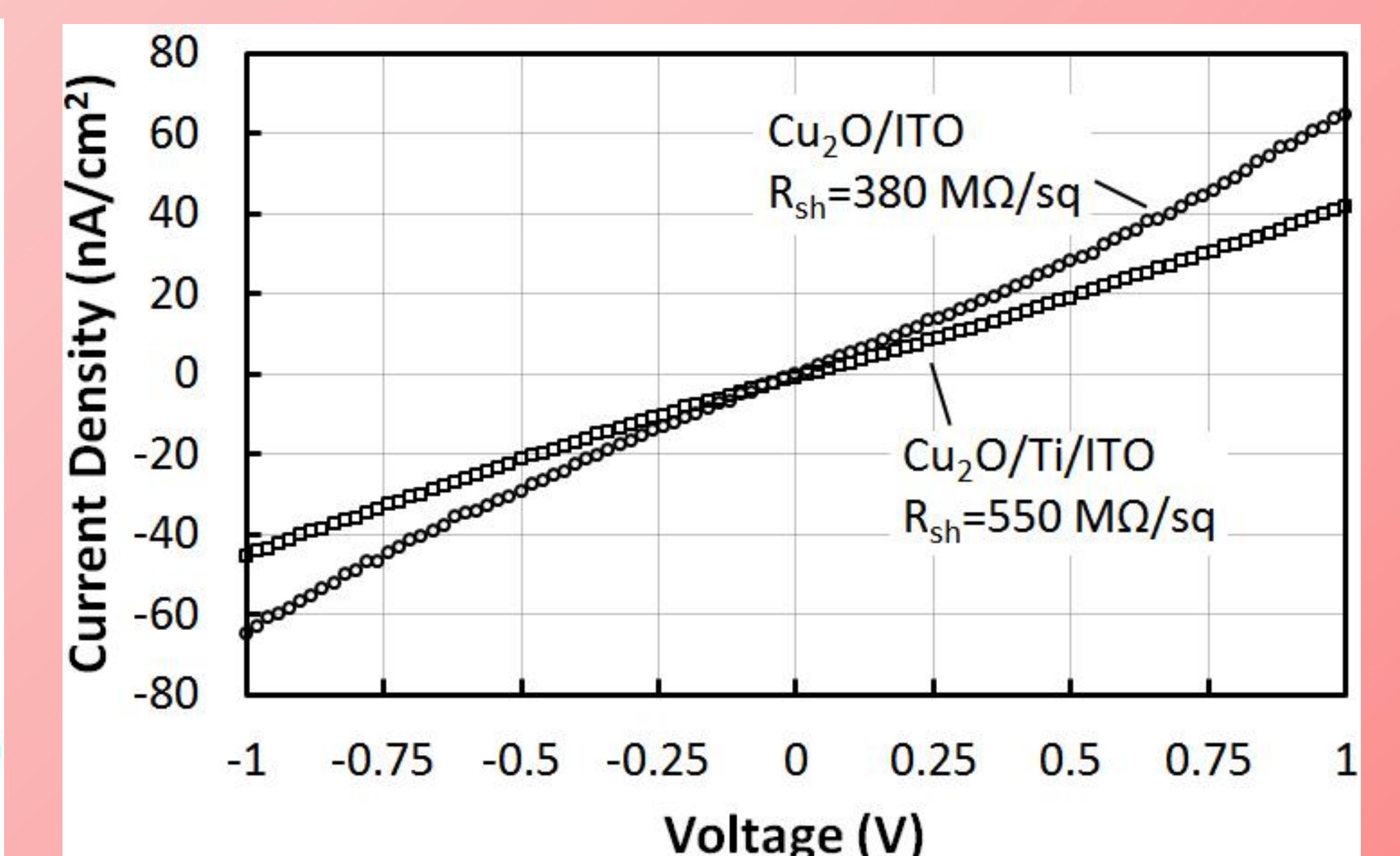
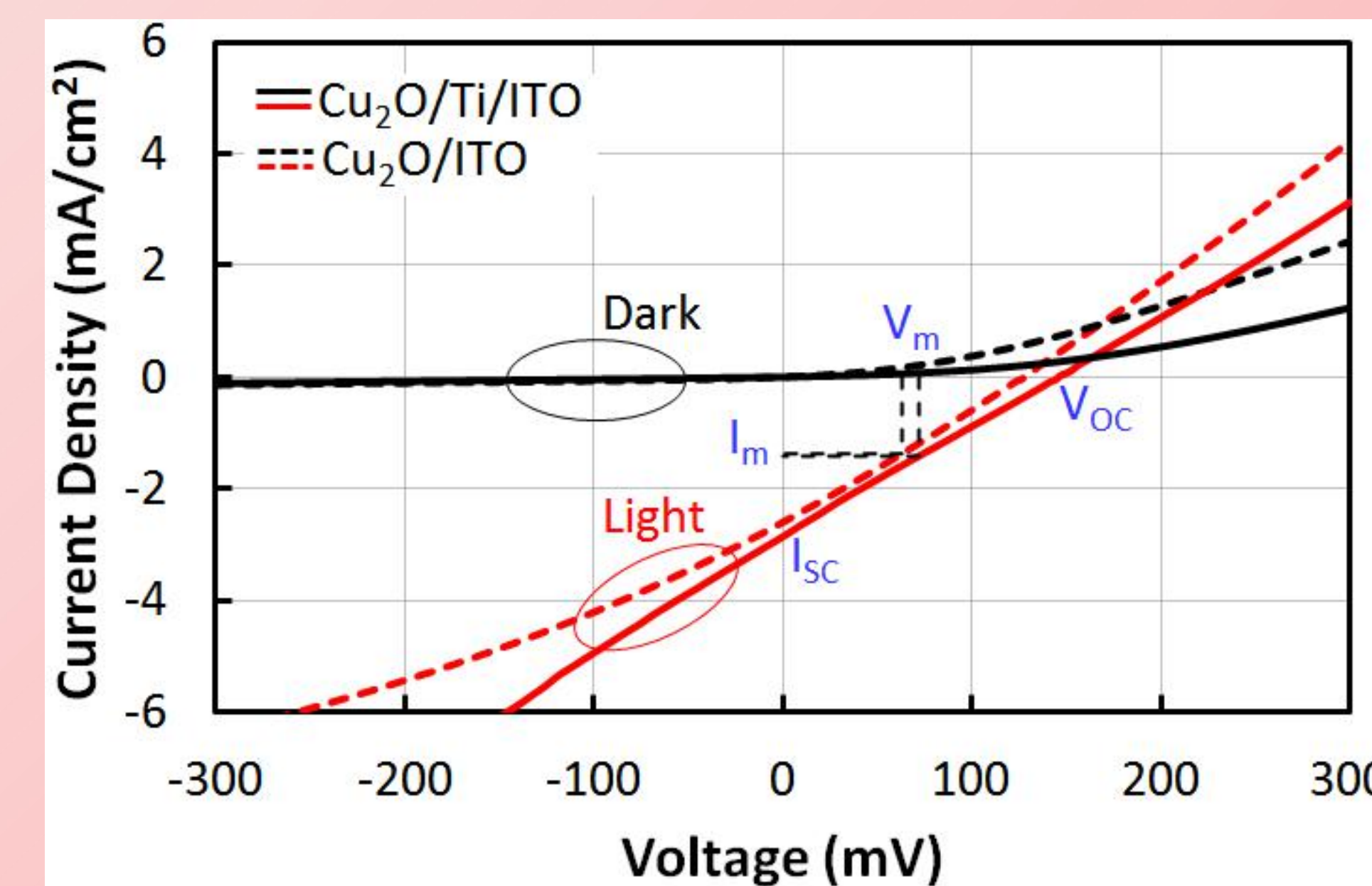
Test Results



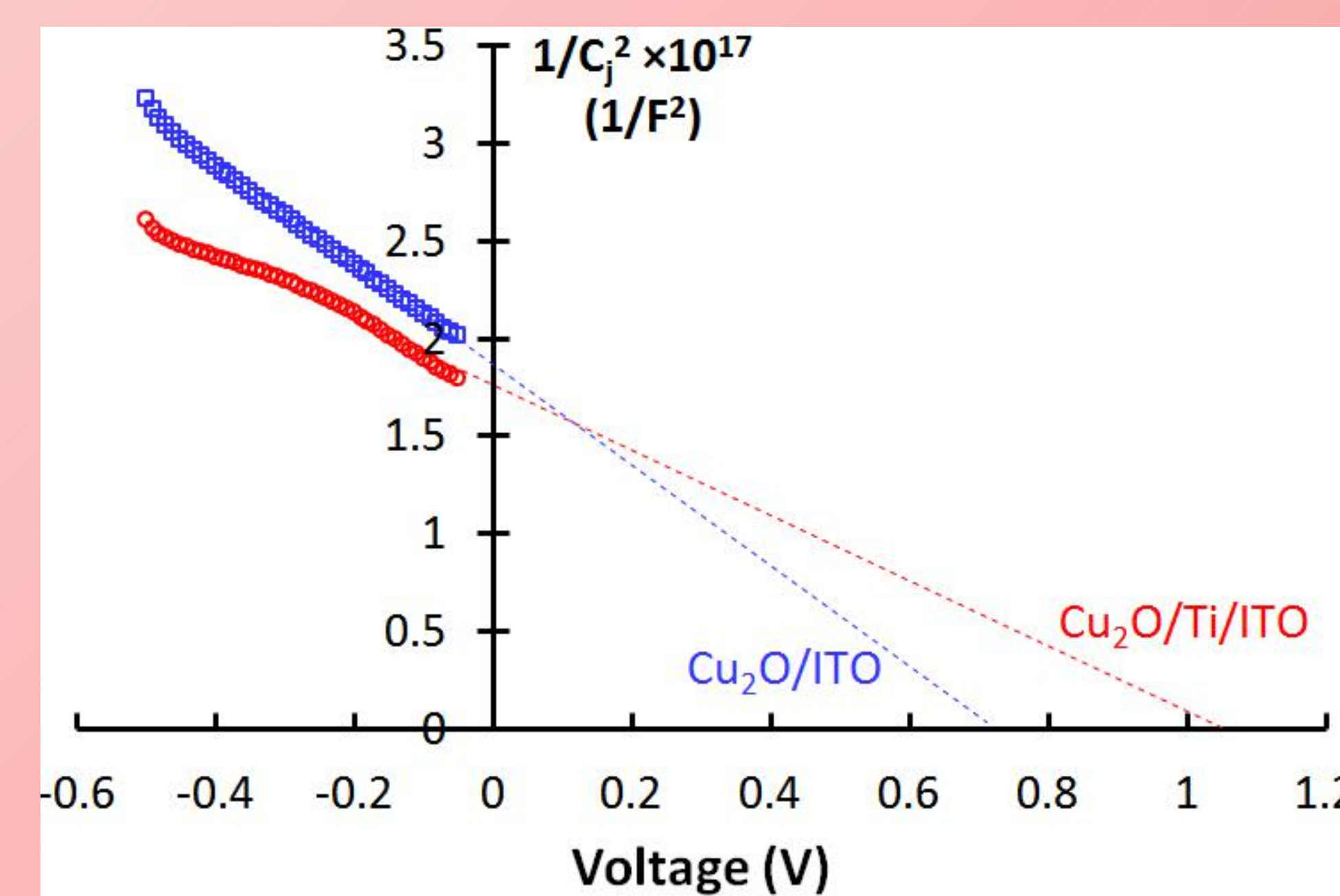
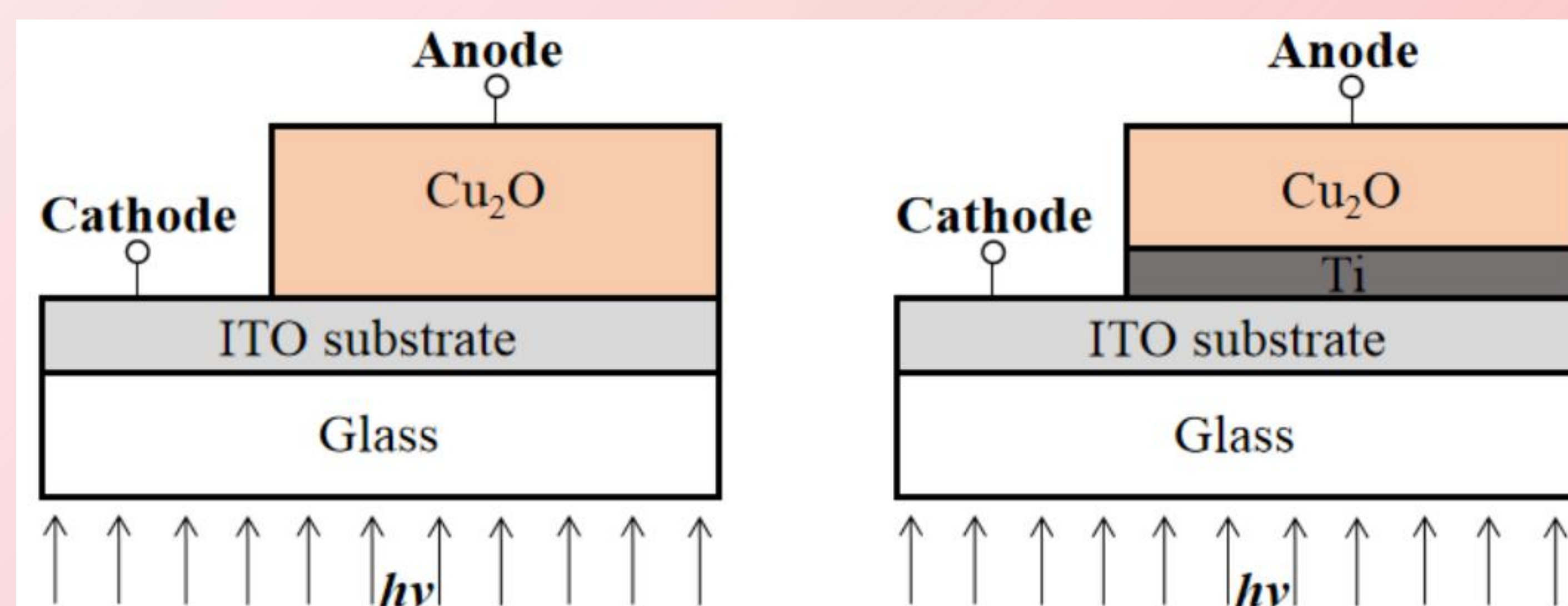
Cu₂O/ITO



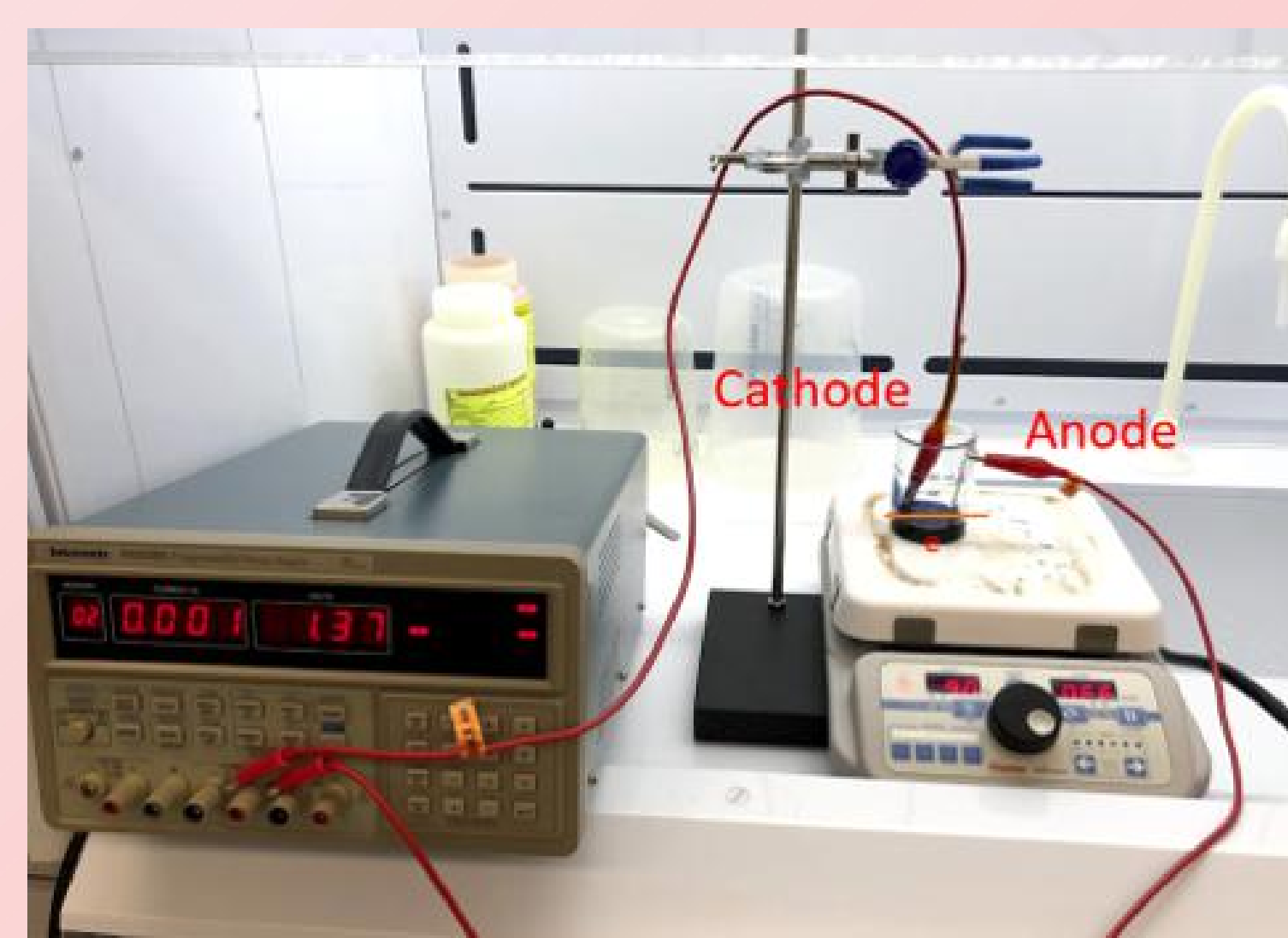
Cu₂O/Ti/ITO



Device Structures and Methodology



[Watch our solar cell](#)



Electrolyte for electrodeposition



Solar cell	n	ϕ_i (V)	V _{oc} (V)	I _{sc} (mA/cm ²)	V _m (V)	I _m (mA/cm ²)	P _m (mW/cm ²)	FF (%)	η (%)
Cu ₂ O/ITO	1.21	0.74	0.129	2.6	0.063	1.37	0.086	25.8	0.35
Cu ₂ O/Ti/ITO	1.64	1.01	0.147	2.86	0.072	1.41	0.102	24.2	0.40

Conclusion

- Cu₂O films were synthesized by electrochemical deposition
- Cu₂O/Ti/ITO and Cu₂O/ITO solar cells were successfully fabricated with photovoltaic properties demonstrated