DOE Solar Energy Technologies Program Peer Review

Miasolé

Denver, Colorado

April 17-19, 2007

Objective

- Miasolé's approach is to dramatically reduce both the module cost and the costs associated with mounting the PV on a building.

- This is accomplished by significantly lower manufacturing costs for the solar cell material and incorporating the solar cell material into traditional building products.

Miasolé's Focus

- Miasolé will offer disruptive technologies across the entire PV system, including cell, module, inverter and installation.

Participants

- **University of Colorado** –building integrated systems
- **University of Delaware** – Institute for Energy Conversion – study of the p-n junction
- **Sandia** – module reliability
- **NREL** – General CIGS research
- **Exeltech** – AC inverter for PV modules
- **Carlisle-Syntec** – integration of PV into membrane roofing material

CIGS Process Manufacturing Challenges

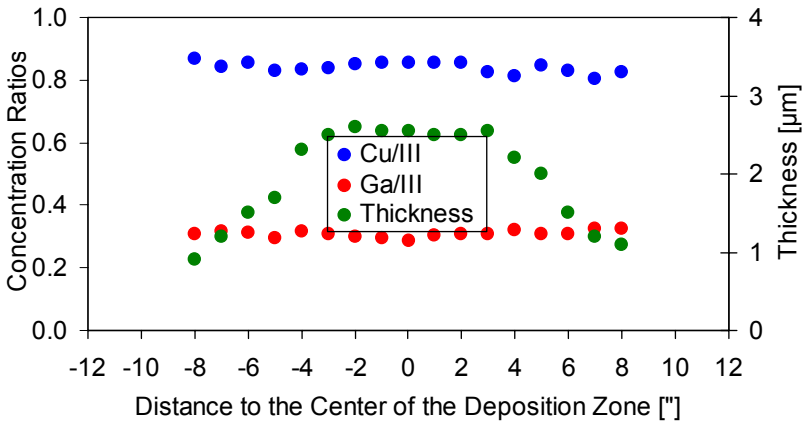
Evaporation

- No Plasma
- Few Ions and Electrons
- Low Energy (~.025ev)
- Little atomic Hydrogen
- No UV light
- Low Contamination(<1ppm)

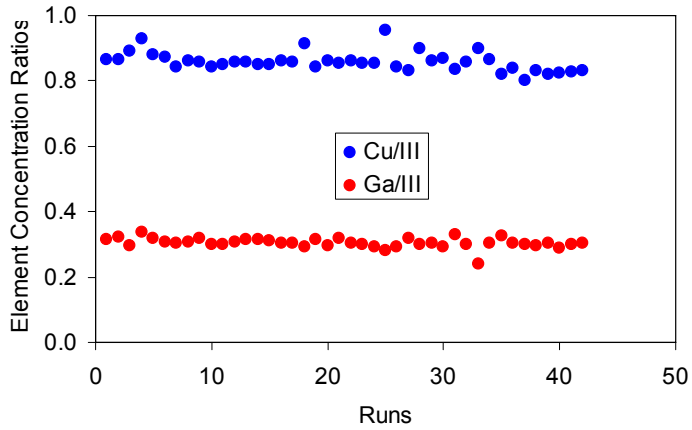
Sputtering

- Plasma
- Many Ions and Electrons
- High Energy (>1ev)
- Significant atomic Hydrogen
- Intense UV Light (>2ev)
- Higher Contamination(>5ppm)

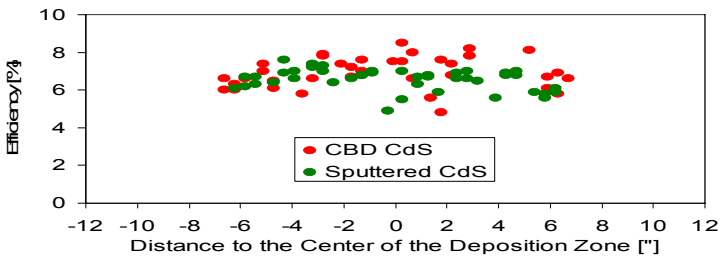
Sputtered CIGS Data



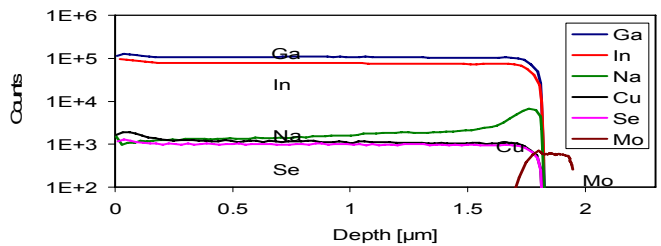
CIGS Thickness Vs. Composition



CIGS Composition Vs. Runs

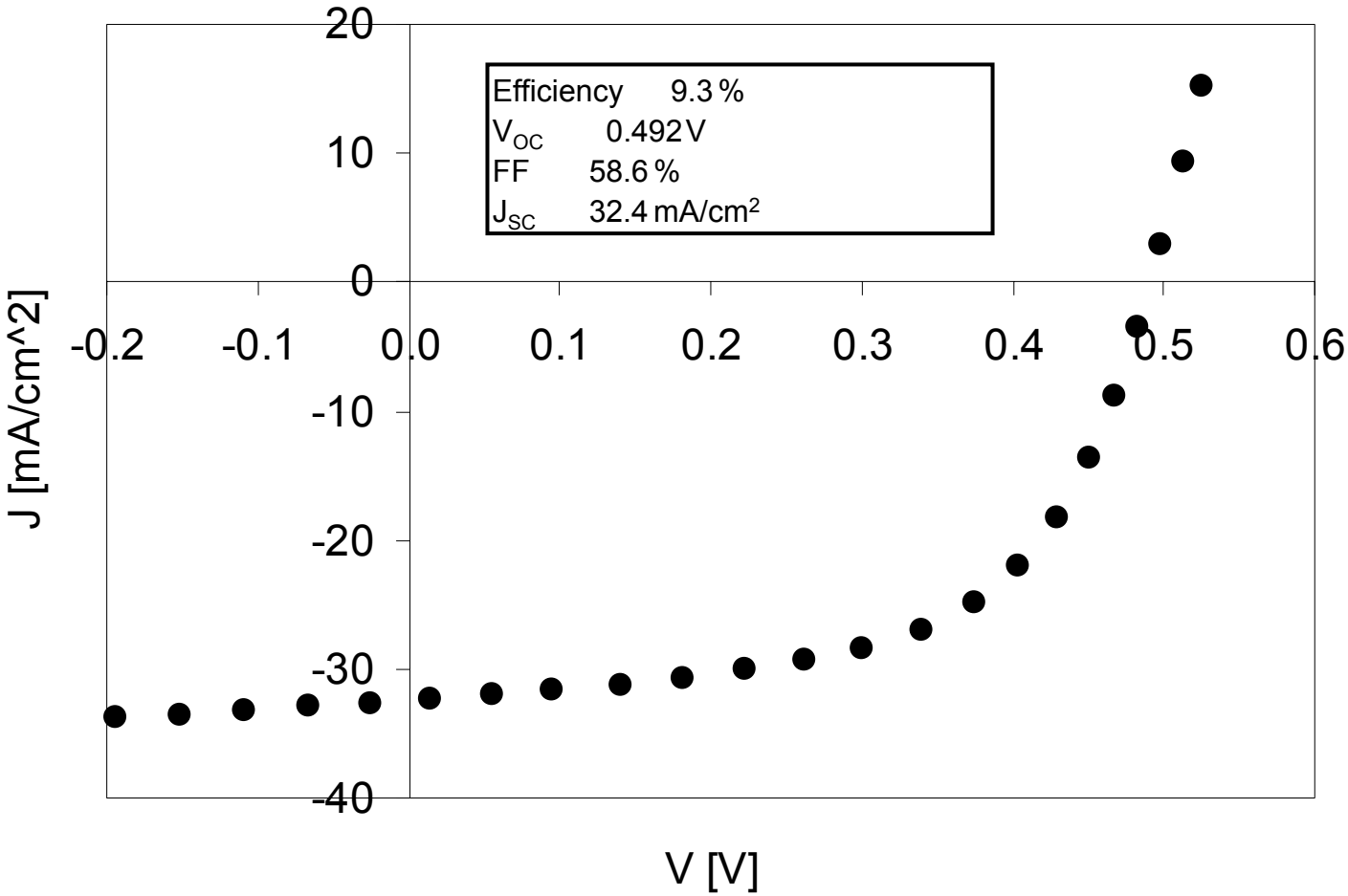


CBD Vs. Sputtered CdS



CIGS Composition Vs. Film Depth

Sputtered CIGS I-V Curve



Miasolé's R&D Lab

CIGS Evaporation

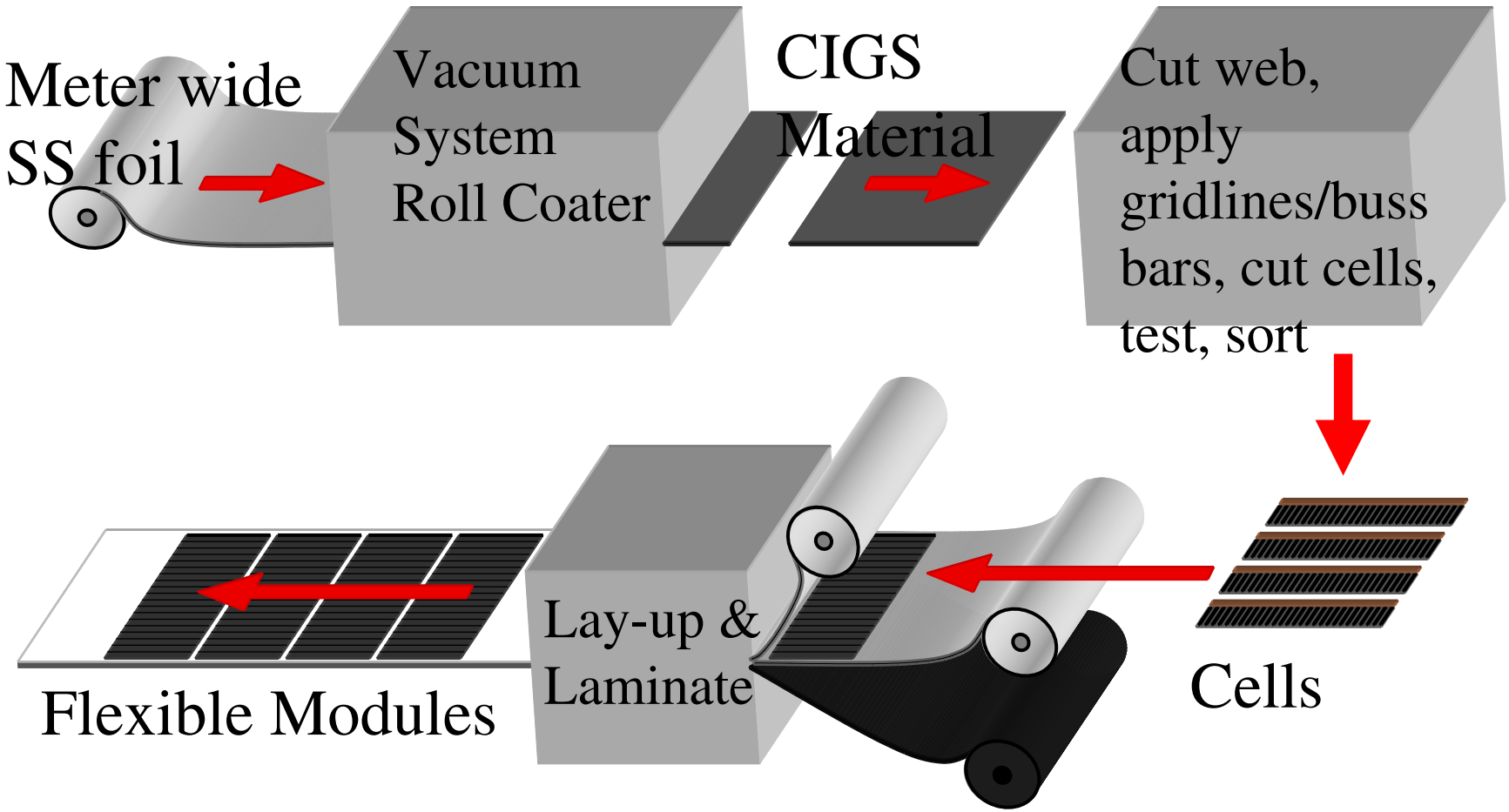
CIGS Sputtering

CdS, iZnO, & AZO Sputtering

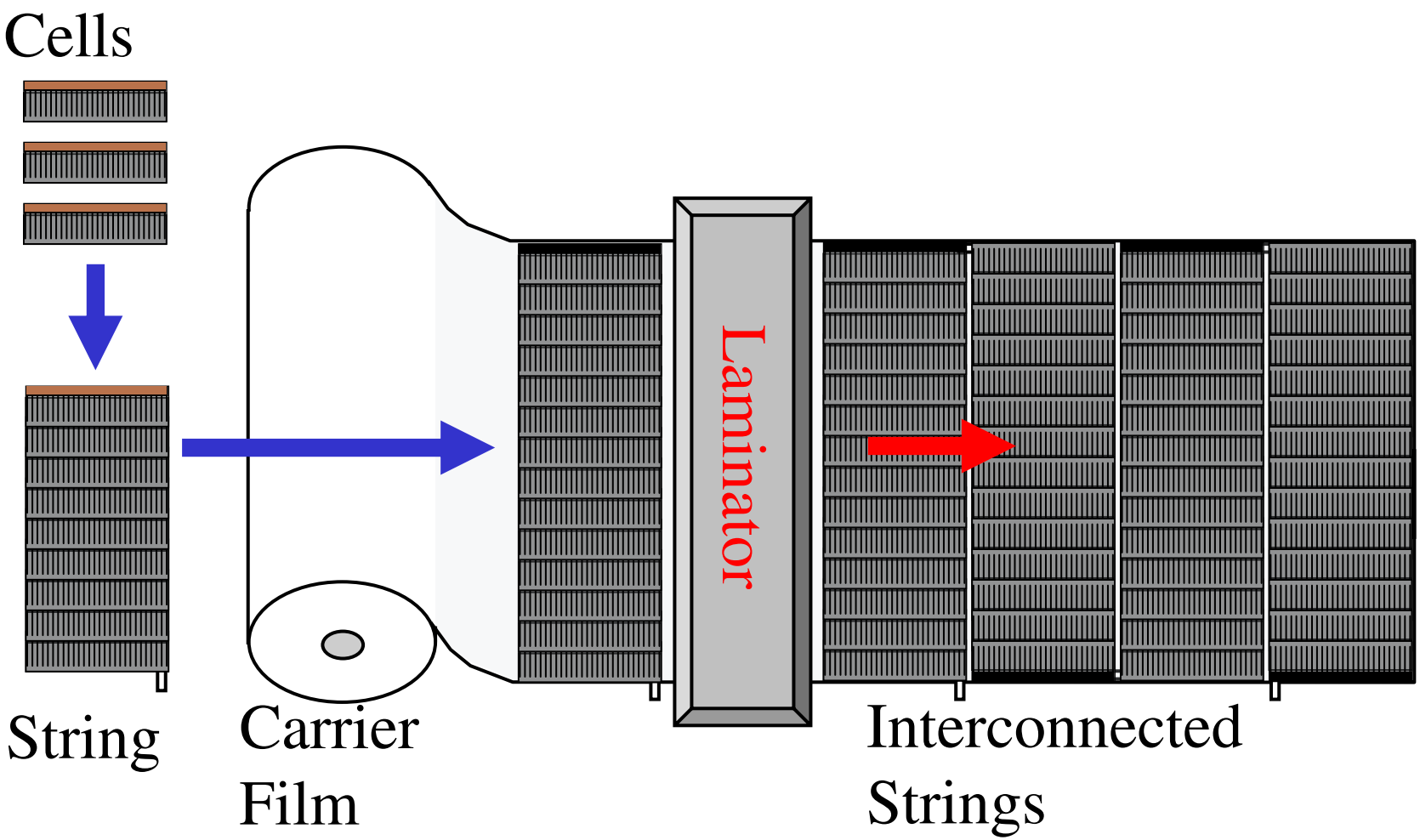
Grid Line, NaF, etc. Evaporation

Miasolé's 1st Production Line

Roll-To-Roll PV Module Process Flow

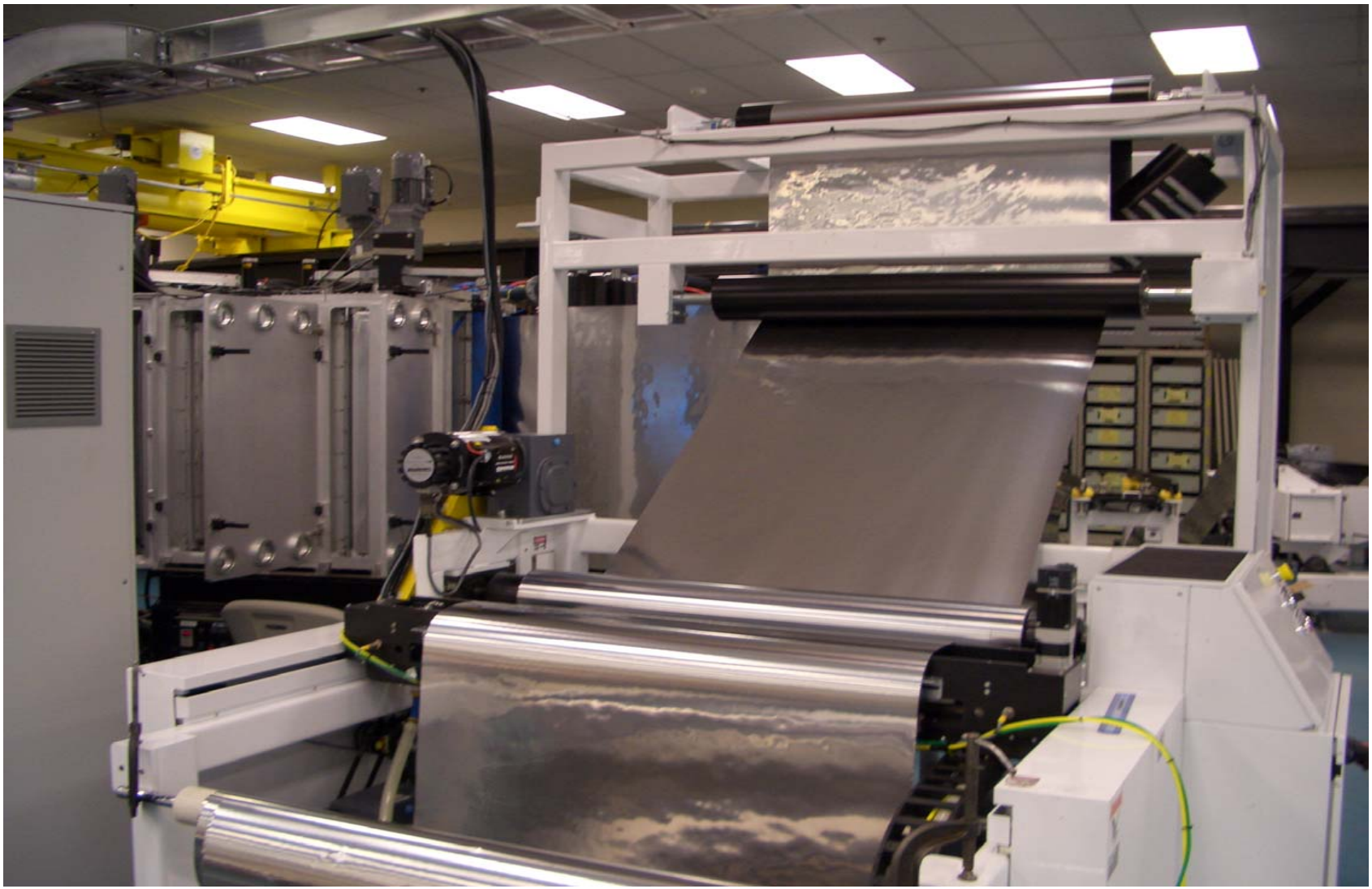


Cell String Assembly



Miasolé's Production floor

25MW CIGS Production Line



Task Summary

Task 1	**Thin Film Process Development**
Task 2	**Collection Grid Development**
Task 3	**Roll Coater Development**
Task 4	**Automated Pre/Post Deposition Process**
Task 5	**Test Systems Development**
Task 6	**Production Cost Reductions**

Task Summary

Task 7	**Yield Management**
Task 8	**Flexible Module Development**
Task 9	**Module Development**
Task 10	**Rooftop BIPV Systems Development**
Task 11	**Manufacturing Process & Equipment Development**
Task 12	**Sales and Marketing Development**