

### 8.3.3 Summary to: 8.3 Making Thin Film Solar Cells

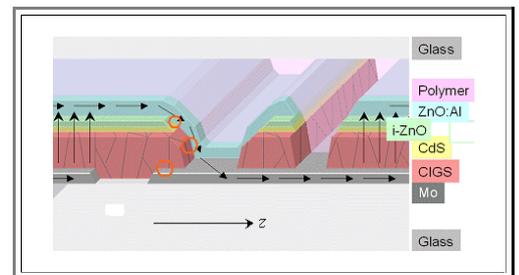
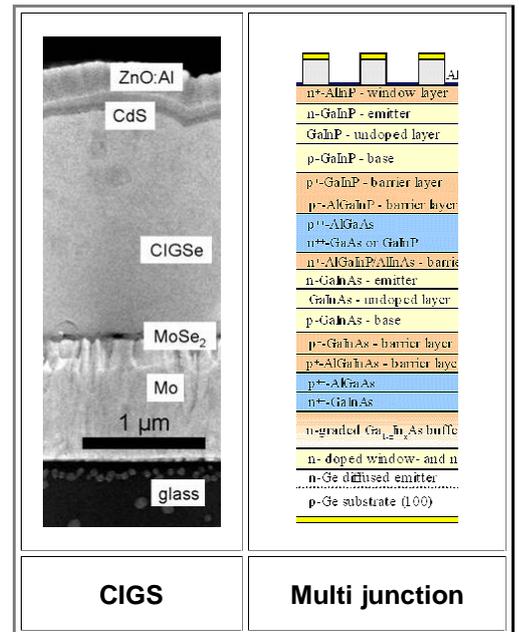
- Thin film solar cells need to meet some key requirements:
- Process-compatible and cheap substrate  $\Rightarrow$  large area deposition.
  - Suitable direct band gap  $\Rightarrow$  high absorption coefficients
  - Insensitivity to "defects"
  - Technology for junction and good ohmic contacts.
- Major contenders in (or close) to production are:
- Amorphous **Si**.
  - Nanocrystalline thin film **Si**.
  - Polycrystalline thin film **Si**.
  - The **CuIn<sub>x</sub>Ga<sub>1-x</sub>Se<sub>2</sub>** or "**CIGS**" family.
  - The **CdTe** solar cell.
  - May others in **R&D**
- The present "high potentials" are **CdTe** and **CIGS**.

High-efficiency multi-junction solar cells may find applications as "concentrator cells" at the focus point of a large mirror or lens that tracks the sun.

**CIGS** and most other thin film solar cells have high internal resistances and need to be switches in series after about **1 cm** for high performance

- This must be done automatically and in-situ as part of the production process.
- A whole new technology needs to be developed for thin film solar cell mass production

The race between bulk **Si** solar cells and thin film technologies is open in **2008**; the winning technologies are to be determined.



**Exercise 8.3-2**

**All Quick Questions to 8.3**