High-Efficiency Thin-Film Silicon Solar Cells in Triple Junction Configuration


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Tandem and Triple solar cells

- Proven reliability >20 years
- Low energy payback time of less than 1 year
- All raw materials are abundant and non-toxic
- Low material use (< 2 µm silicon)
- Established manufacturing technology
- Attractive for large scale deployment

Light scattering ZnO substrates

- Textured front contact of ZnO grown by LP-CVD
- Ar plasma converts from rough to smooth texture
- Rough ZnO: good light scattering
  => high current density
- Smooth ZnO: good growth template,
  => high Voc and fill factor

Solar cell performance

High-efficiency triple cells in p-i-n configuration reach 13.5 %, they stabilize at 12.8 % after 1000 h light soaking

Conclusions

- Ar plasma is used to modify the light scattering of textured ZnO films
- A Summed current density >30 mA/cm² is demonstrated
- High-efficiency triple cells in p-i-n configuration reach 13.5 %, they stabilize at 12.8 % after 1000 h light soaking

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