

SOLIBRO

Introduction to study visit

Marika Edoff

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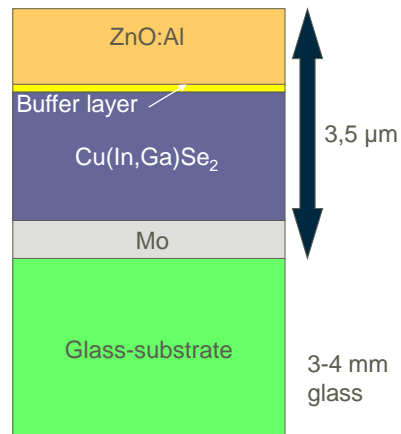
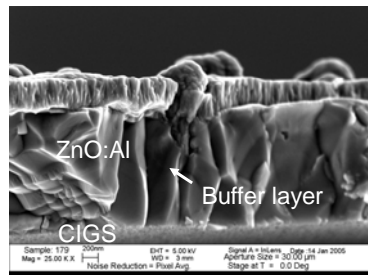
History:

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- 2000 Solibro is founded
- September 2003 Development activities start (funding from Swedish/Norwegian consortium and Swedish Energy Agency)
- November 2006 Joint venture contract between Solibro AB and Q-Cells AG
- Two new companies formed: Solibro GmbH and Solibro Research AB
- August 2007 Start building 30 MWp factory
- April 2008; first modules out from factory
- August 2008 First 1 MW sold, decision on expansion to 135 MWp
- July 2009; Agreement to become full subsidiary of Q-cells, ramp up of new factory starts

Technology: Thin layer sequence

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- Glass cleaning
- Back contact Mo sputtering
- CIGS: co-evaporation of Cu, In, Ga och Se
- Buffer 1: wet chemical deposition of CdS
- Buffer 2: sputtering of high resistive ZnO
- Front contact: sputtering of Al-doped ZnO

3

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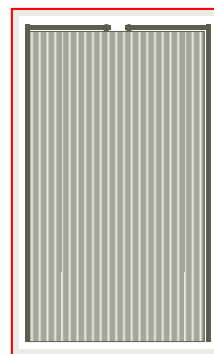
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Technology: module fabrication

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- Three patterning steps
- P1: isolation of back contact of cells
- P2: interconnect opening between Mo and ZnO:Al
- P3: isolation of front contact of cells
- Edge isolation
- Removal of material from edges (sand blasting)
- Drilling of holes
- Holes in the glass substrate for wires to junction box
- Tabbing
- Application of tab wires along the edges of module
- Lamination
- Edge sealing and EVA lamination to front glass
- Mounting of junction box
- Measurement
- Current voltage characterization in flash light
- (Framing)



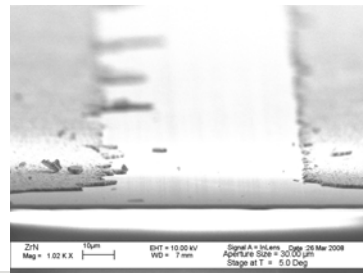
4

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Patterning of modules

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5

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Efficiency comparison cell and module

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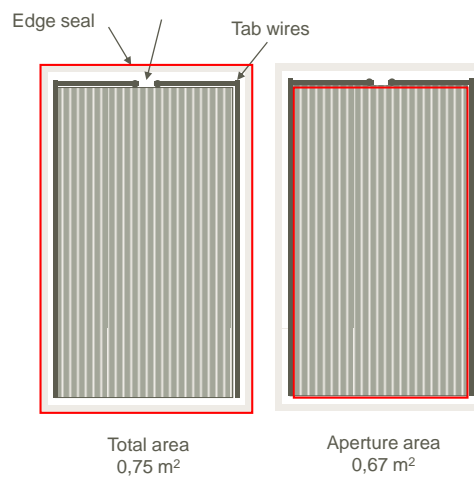
Dead area in a module

- Edges
- Contacts
- Interconnect lines

A module needs thicker ZnO than a cell

- Absorption of light in ZnO
- Absorption of light in front glass and encapsulant

Lower current/unit area in a module than in a cell



6

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Status

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Products: 75-80 Wp, with and without frame, 0.75 m²

Efficiency. Total-area: 10-12.3 %

Aperture area efficiency: 11-13.5 %

Highest efficiency for any commercial thin film module



7

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Example: 6300 Wp Ultuna

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84 modules, 75 Wp each
Student cantina "sylvan" SLU
Installed summer 2008
Owner: Akademiska Hus
Installer: Gridcon AB

8

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Solibro Research AB

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Research and development in Uppsala

30 employees

High level of competence, many PhDs!

Next generation CIGS

Some development also at Uppsala University



9

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Some rules for the study visit!

SOLIBRO

Limited number of participants (registered in advance)

No photography inside Solibro building!

In the production hall:

Use shoe protection

Keep close to your guide

Welcome!



10

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