International Advanced Research Centre for Powder Metallurgy & New Materials (ARCI)

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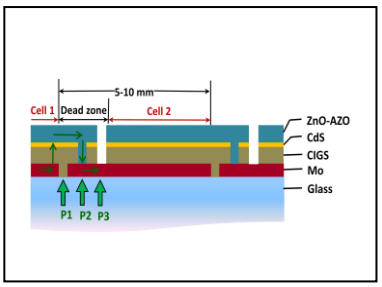
Pilot scale R&D for fabrication of CIGS thin film solar cell

Overview

Due to reduced material and energy input thin-film provides still advantages compared to crystalline silicon-based PV technologies. In terms of cost per watt and efficiency of Cu(In,Ga)Se_2 (CIGS) solar cell is considered to be the most promising thin-film PV technology. The efficiency evolution of CIGS during the last few years has been the most impressive within the thin-film materials, moreover comparable to multi-crystalline silicon cells and even more efficient than amorphous silicon (a-Si) and cadmium telluride (CdTe) while using a minimum of materials to produce. The current challenges include reducing the manufacturing cost and faster transfer of R&D results to industrial production. Due to the fact that the CIGS manufacturing process is more complex and less standardized than the processes for other types of cells, it is necessary to select appropriate process route and maintain the manufacturing as flexible as possible. A monolithically integrated CIGS thin film solar cell on 300 mm x 300 mm being researched and developed at ARCI has promising features over the existing technologies.

Key Features

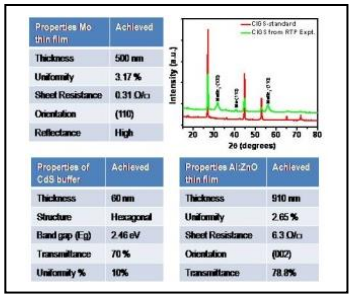
- Device fabrication capacity on substrate size of 300 mm x 300 mm.
- Unique non-toxic two step process for selenization.
- Tooled to make monolithically integrated CIGS thin film solar cells.
- Potential to make device on flexible substrates.



Schematic of Molothically integrated CIGS thin film solar cell

Potential Applications

- Building integrated photovoltaics (BIPV)
- Application for DC power appliance



Intellectual Property Development Indices (IPDI)

- Achieved desired properties of individual layers in CIGS thin film solar cell
- Full cell fabrication and performance evaluation underway

Status	1	2	3	4	5	6	7	8	9	10

Major patents/Publications

1.Process parameter impact on properties of sputtered large-area Mobilayers for CIGS thin film solar cell applications, Amol C. Badgujar, Sanjay R. Dhage*, Shrikant V. Joshi, Thin Solid Films 589 (2015) 79–84

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