

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

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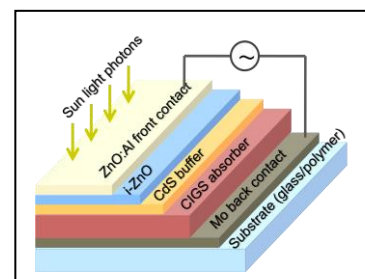
CIGS thin film absorber by non-vacuum ink based route

Overview

The existing high temperature and vacuum processing and selenization treatment used in CIGS thin film solar cell fabrication are neither cost effective nor easily scalable to high volume production. Non-vacuum processes have great interest for low cost chalcopyrite based photovoltaic technologies. A key feature in these processes is the selenization treatment has significant impact on the microstructure of the absorbers and, in turn, are determining for the performance of the device. In this context, a two step non-vacuum process (printing and post treatment) for the preparation of CIGS absorber layer without selenization is being developed at ARCI. The process is novel and expected to have large impact in CIGS PV industry in terms of cost reduction and easy processing. Moreover, the non-vacuum route will reduce the number of processing steps in complete cell fabrication.

Key Features

- Scalable non vacuum manufacturing process for CIGS without toxic selenization
- Solution processing using printing techniques such as inkjet printing, spraying and doctor blading
- Environmentally benign flash light post treatment method
- Processable on Light weight and flexible glass substrate



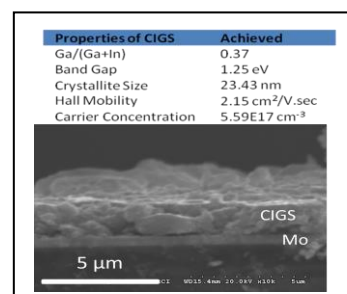
Schematic cross section of CIGS thin film solar cell

Potential Applications

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

Intellectual Property Development Indices (IPDI)

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



Properties and cross section of CIGS thin film absorber on Mo glass by non-vacuum ink based route

Status	1	2	3	4	5	6	7	8	9	10
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Major patents/Publications

1. Improved method of manufacturing copper-indium-gallium diselenide thin films by laser treatment. Patent application No: 2084/DEL/2212, Date: 05/07/2012, Inventors: Sanjay R. Dhage, Manish Tak and Shrikant V. Joshi
2. Non-vacuum route for CIGS thin film absorber on flexible glass substrates, Amol C. Badgujar, Madhuri Kukkadapu, Sean Garner, Sanjay R. Dhage* and Shrikant V. Joshi, *2015 IEEE Photovoltaic Specialist Conference, PVSC 2015*, art. No. 7356105
3. Fabrication of CIGS thin film absorber by laser treatment of pre-deposited nano-ink precursor layer, Sanjay R. Dhage*, Manish Tak and Shrikant V. Joshi, *Materials Letter* 134 (2014) 302

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