DISC

Newsletter#1

Double Side Contacted Cells

with innovative carrier selective contacts

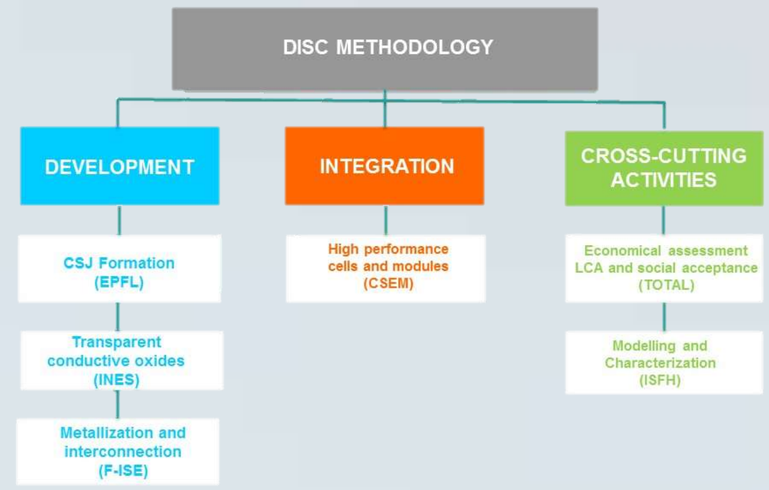

Fig. 1: DISC Methodology

General description

The DISC project addresses the need to reduce the consumption of fossil fuels by developing key technologies for the next generation of high performance photovoltaic (PV) solar cells and modules, allowing ultra-low solar electricity costs with minimum environmental impact.

Focus & targets

Technological

- Double-side contacted Silicon solar cells with carrier selective junctions and optimized metallization and TCO.
- Efficiencies > 25.5% on large area cells (> 100 cm^2) and > 22% at module level with area < 1.65 m^2.

Economical

- Lower levelized costs of electricity between 0.04 – 0.07 €/kWh.
- Reduce fabrication complexity and production line investment: 0.04 €/W_p of production cost on module level and a mid-term potential of 0.33 – 0.35 €/W_p

Sustainability

- Increased efficiency, reliability and durability.
- Reduced non-abundant material consumption (Silver, Indium)

Increased viability and attractiveness of the PV systems

More competitive EU PV scientific and industrial stakeholders

Highlights at September 2017 (M12)

Junction formation

Demonstration of recombination current densities around 5 fA/cm^2 for electron- and hole-selective contacts on textured and planar surfaces, respectively. Application on the full area p-type c-Si solar cells results in efficiency above 22%.

Transparent Conductive Oxides

Further development of both high-performance In-based TCOs and low-cost Zn-based.
Studies on several TCO/CSJ contacts showing low contact resistance (< 0.1 Ω cm^2).

Metallization and Interconnection

Development of Cu plating approach with excellent contacting properties ($r_c < 0.16\,m\Omega{\cdot}cm^2$; fingers: $\sigma > 3.7{\cdot}10^7$ S/m, $w < 30\,\mu m$, $h > 15\,\mu m$) maintaing $V_{OC} > 730$ mV leading to 83% FF on front and rear plated 6” CZ-Si precursors with TCO.

Modelling and characterization

Verification of transparency dependence on deposition temperatures of poly-Si.
Development of 3D simulation model for TLM measurement with complex structure geometry.
Structural investigation of the impact of annealing step on TCO stacks.

Dissemination and exploitation

Presence at SiliconPV 2017 conference with three scientific contributions.

Presence at EUPVSEC 2017 conference with six scientific contributions.

Partners

- ISFH
- EPFL
- CEA
- FH-ISE
- CSEM
- MEYERBURGER
- TOTAL
- Univerza v Ljubljani
- Von Ardenne
- MECO
- ECOSOLIFER
- AYMING
- ERM

Looking ahead

- DISC is now entering the integration phase, combining the best components from all partners (carrier-selective junctions, TCOs, metallisation and interconnection schemes) on highly-efficient cells and modules
- Underpinning of process flow with life-cycle analysis and cost assessment

Countries involved

France, Germany, Netherlands, Slovenia, Switzerland, Hungary, United Kingdom

Duration

3 years: 01/10/2016 to 30/09/2019

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