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Project Director: Ioana Pintilie
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Project Program: EEA-JRP-RO-NO-2013-1
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Coordinator:
National Institute of Materials Physics (Romania)

Partners :

University of Oslo (Norway)

University of Iceland (Iceland)

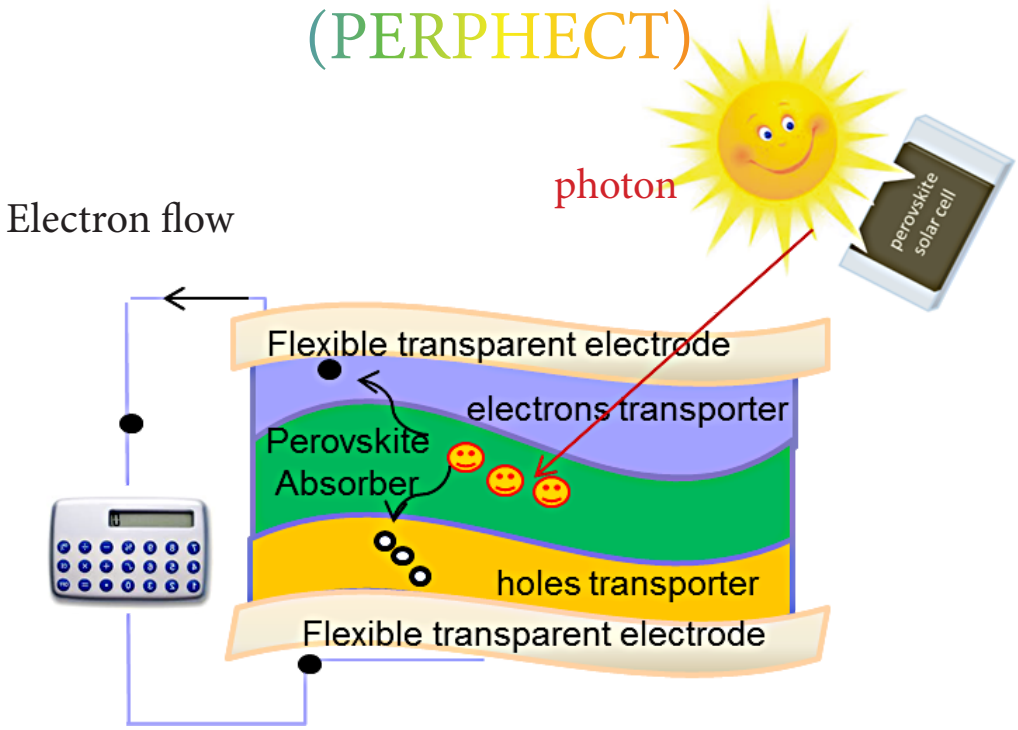
Reykiavik University (Iceland)

Bucharest University, Faculty of Physics (Romania)

Optoelectronica 2001 S.A. (Romania)

http://www.infim.ro/projects/perovskites-photovoltaic-efficient-conversion-technology-0

Perovskites for Photovoltaic Efficient Conversion Technology (PERPHECT)



The main objective of the project is to develop perovskite-based photovoltaic devices towards "all perovskite" solar cells with power conversion efficiencies approaching 20% and fabricated with affordable, environmental friendly materials and technologies (low cost printing like methods). The final goal is to have an efficient, flexible structure with transparent electrodes on both sides, able to collect not only the sun-light but also the light coming from the artificial sources used, especially during the winter, inside office buildings or large malls.

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Scientific challenges with relevance for direct practical use that will be solved during the project are :

- replacing the actual transparent conducting electrodes based on ITO or FTO (In, Sn are deficient materials, while F can be potentially harmful for the environment) with metal nanowebs covered with AZO (Al doped ZnO).
- optimizing the interfaces between the halide perovskite light absorber and the electron and hole transporters (low density of interface defects leads to longer lifetime for the photo-generated carriers and to a better efficiency).
- enhancing the charge collection by introducing more efficient active layers in intimate contact with the light absorber.

The innovative aspects of the project are:

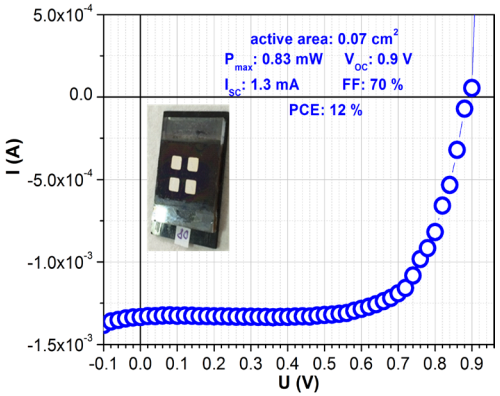
- The fabrication of solar cells with transparent electrodes on both sides. Deposited on glass windows, these cells will harvest not only the Sun light but also the indoor light which otherwise is wasted.
- The use of printing-type technology for fabricating the test structures at pre-industrial level.

The project includes both basic and applied research. The first two years will be dedicated more to basic research in order to understand the physics behind the working principle of the new perovskite dye used in recent year, as well as in finding ways to optimize the over-all efficiency by enhancing the charge collection and minimizing the deleterious effects of series resistance. The third year will be dedicated more to applied research in order to optimize the low cost technology and build up a laboratory demonstrator.

Personnel: 39 researchers and technicians, 10 of them being PhD students and Postdocs.

Results after the first 10 months of the project

Standard cells with halide perovskite



Flexible electrodes based on AZO and metal nanowebs