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edited by R.A.J. Janssen

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René A. J. Janssen
Eindhoven University of Technology, Netherlands

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Solar energy has an enormous potential for satisfying the future global energy demand. Hybrid and organic solar cells are making rapid advances in terms of efficiency, lifetime, and technology and have a true promise to become an important source of renewable energy. In addition, they present fascinating opportunities for scientific research and technological development. The main topics of this conference are the development, function and modeling of materials and devices for hybrid and organic solar cells, including dye-sensitized solar cells, polymer-fullerene solar cells, small molecule organic solar cells, and other 'excitonic' solar cell technologies, including hybrid organic-inorganic and nanostructured devices.

Building upon success of the previous HOPV conferences, the HOPV 2013 conference will provide a excellent opportunity for scientists and engineers around the world for discussions of the latest developments in hybrid and organic photovoltaics. The conference will be led by world leading invited speakers covering a broad range of the latest scientific advances in morning plenary sessions. The conference encourages presentation of oral as well as poster contributions from scientists from all over the world, which will be presented in two parallel sessions running in the afternoons. Just submit your abstracts before the deadline, which is strict. Special attention is given to the poster contributions.

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P44 Laser sealed DSCs: Efficiency and Long term stability analysis

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The environmental pollution arising from oil spills and the climatic consequences of the greenhouse effect caused by fossil fuels combustion fostered the development of several alternatives for energy production. Solar energy is the fastest growing segment of renewable energy sources, which in the non-OECD countries is expected to grow annually 22.8 % until 2035. The forecasts for 2015 put total installed photovoltaic (PV) capacity in the world between 131 GW and 196 GW [1].

Dye sensitized solar cells (DSCs) are an important type of thin film photovoltaics (PV), which have attracted much attention since the work by Grätzel et al. in 1991.[2]DSCs have been considered an effective alternative to conventional p-n junction devices mainly due to their low production cost and simple fabrication, ability to harvest diffuse light and versatile applications, such as flexible or light-weight products and BIPV applications[3-5]. In fact, the DSC technology has recently been used in showcase applications by several companies (Sony, Panasonic, G24i, Dyesol, 3G Solar, etc). However, for DSCs become a competitive alternative to present PV technologies, major breakthroughs are necessary concerning the two critical aspects of any PV device: power conversion efficiency and lifetime. Regarding the device lifetime, at least 25 years of constant power conversion efficiency should be guaranteed for outdoor applications[6-10]. Despite all the efforts to enhance DSCs' performance, long-term stability is still a major issue that limits market implementation. The long-term stability problem of the DSC design is directly related to the traditional sealing methods, which use a thermoplastic sealant as Surlyn® or Bynel®.

This work follows our previously reported process [11,12] for laser assisted glass frit sealing, and proves that the developed production process results in stable and efficient DSC devices. The laser sealing process is applied to several cell and module formats ranging from 1 to 230 cm^2 – Figure 1. The printed glass frit ensures a constant spacing between electrodes (~30 µm) and performance tests show that the laser sealing process does not affect the DSCs performance. Thermal experiments were conducted in a thermal chamber Aralab FitoClima 300 following the international standard IEC 61646 for thin-film terrestrial PV modules. Samples were analyzed concerning IV characteristics and EIS kinetics before and after the thermal cycles, proving that this sealing process can bring stable and efficient DSCs to the PV market.

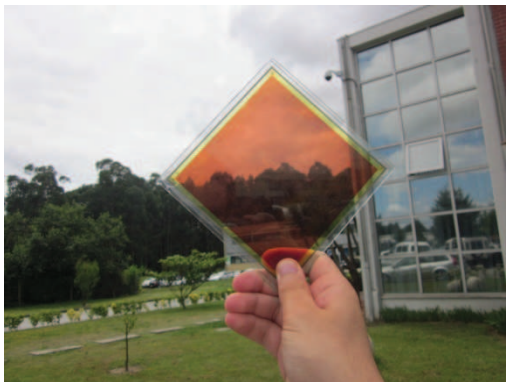

Figure 1 Dye sensitized solar cell (150x150 mm) produced by the laser assisted sealing process

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