Flexible dye-sensitized solar cells

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High enough efficiency and low production costs are important characteristics to make dye-sensitized solar cells (DSC) modules competitive to other alternatives on the solar energy market. A short cut to reach the market would be to focus initially on indoor applications where parameters like efficiency and durability may not be as harsh as for outdoor applications. The competitor to the DSC cells for indoor applications is the amorphous silicon cell already being produced at low prices in large-scale facilities. The conclusion therefore is that much attention has to be given also to the cost reduction potential in possible production technologies for DSC cells if it shall be able to become commercial in the future.

A continuous production process has generally a high potential for low cost production. The present paper describes our development of a method for manufacturing the nanostructured porous layers, for the working and counter electrodes, at room temperature. The porous layers are pressed on a conducting glass or plastic substrate [1]. The method compresses the particle layer to form a mechanically stable, electrically conducting, porous nanostructured film. Overall solar to electric conversion efficiencies of up to 6.1% at 0.1 sun using plastic substrates have been obtained.

A major goal for our activities in the Angstrom Solar Center is to demonstrate the feasibility of manufacturing DSC modules in a continuous process. Possible solutions to some of the necessary steps in such a process will be described at the meeting. Efficiencies obtained with interconnected plastic modules as well as results from stability tests of cells for indoor applications will be presented.

1. H. Lindström, A. Holmberg, E. Magnusson, S. –E. Lindquist, L. Malmqvist, and A. Hagfeldt, *Nanolett.*, 1, (2001), 97-100.