

Molecular Photovoltaics and Mesoscopic Solar Cells

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Chemistry is expected to make key contributions to identify environmentally friendly solutions to energy supply problem the world will be facing in the next few decades.. Learning from the concepts used by green plants we have developed a molecular photovoltaic device whose overall efficiency for solar energy conversion to electricity has presently attained 12.3 %. The system is based on the sensitization of mesoscopic metal oxide films by a dye [1-4]. The lecture analyzes the salient fundamental processes of light harvesting and charge carrier generation and collection by this device and discusses the latest research advances in the field. The low cost and ease of production of the new cell will benefit large-scale applications. Impressive stability both under long-term light soaking and high temperature stress has been reached fostering first industrial applications. These systems will promote the acceptance of renewable energy technologies, not least by setting new standards of convenience and economy.

References: [1] B.O'Regan and M.Grätzel, "*Nature* **335**, 7377 (1991). [2] U.Bach, D.Lupo, P.Comte, J.E.Moser, F.Weissörtel, J.Salbeck, H.Spreitzer and M.Grätzel, *Nature*, **395**, 550 (1998). [3] M. Grätzel *Nature*, **414**, 338 (2001). [4] M.Grätzel, *Acc. Chem.Res.* 42(11), 1788-1798, (2009).