

Synthesis of Novel Organic Dyes Based on Indigo for Dye-Sensitized Solar Cells

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Abstract : A novel metal free organic dyes based on indigo was prepared and used as sensitizers in dye-sensitized solar cells. The synthesized dye together with its corresponding intermediates were purified and characterized by analytical techniques. Such techniques confirmed the corresponding structures of dye and its intermediate and the yield of all the stages of dye preparation were calculated to be above 85%. Fluorometric analyses show fluorescence in the green region of the visible spectrum for dye. Oxidation potential measurements for dye ensured an energetically permissible and thermodynamically favourable charge transfer throughout the continuous cycle of photo-electric conversion. Finally, dye sensitized solar cells were fabricated in order to determine the photovoltaic behaviour and conversion efficiencies of dye. Such evaluations demonstrate rather medium conversion efficiencies of 2.33% for such simple structured synthesized dye. Such conversion efficiencies demonstrate the potentiality of future use of such dye structures in dye-sensitized solar cells with respect to low material costs, ease of molecular tailoring, high yields of reactions, high performance and ease of recyclability.

Keywords : conversion efficiency, Dye-sensitized solar cells, indigo, photonic material

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