**Link:** <https://solar-power-tech.com/e-posters/dsc_eposter_09/>

**Abstract**

Nanostructure dye sensitized solar cells (DSSCs) based on indigo dyes exhibit medium to great power conversion efficiency [1]. Such organic dye molecules are easily undergone for aggregation. Aggregation in dye molecules lead to reduce electron transfer process in dye-sensitized solar cell. Therefore, anti-aggregation agents are commonly added to organic solution in DSSCs [2]. In this work, Spectrophotometric evaluations of the indigo dye on a TiO2 substrate in the presence and absence of an anti-aggregation agent were carried out in order to assess changes in the status of the dyes. Therefore, an anti-aggregation agent such as chenodeoxy cholic acid (CDCA) is used with organic dyes. The λmax of dye adsorbed on a TiO2 film in the absence of CDCA and in the presence of CDCA are 595 nm and 580 nm, respectively. Upon dye adsorption on to a TiO2 surface in the absence of CDCA, the wavelength of maximum absorption is bathochromically shifted by 46.5 as compared to the corresponding spectra in solution, implying that dye adsorbed on to TiO2 surface contain partial J-type aggregates [3] but the wavelength of maximum absorption is bathochromically shifted by 31.5 in the presence of CDCA as compared to the corresponding spectra in solution. Therefore, the officious aggregations were reduced in the presence of an anti-aggregation agent. The oxidation potential (Eox) of organic dye was measured in acetonitrile by cyclic voltammetry [3]. There are two distinct redox waves observed in the voltammogram. The first oxidative wave (I) was due to the oxidation of the internal standard of ferrocene, whereas the second wave (II) was due to the electrochemical oxidation of the dye. The oxidation peak potential (Eox) for synthesized dye can therefore be calculated to be 0.57 vs Fc/Fc+ in acetonitrile. The E0-0 of dye was calculated to be 1.88 V, therefore, the Eox-E0-0 level of dye is estimated to be –1.31 V vs Fc/Fc+ in acetonitrile. Finally, dye sensitized solar cells were fabricated in order to determine the photovoltaic properties and influence anti-aggregation agents on their performance. The short-circuit current (Jsc) (mA/cm2), open-circuit voltage (Voc) (V), fill factor (FF) and efficiency (%) of DSSCs in the absence of CDCA are 7.47, 0.64, 0.65 and 3.11, repectively. The short-circuit current (Jsc) (mA/cm2), open-circuit voltage (Voc) (V), fill factor (FF) and efficiency (%) of DSSCs in the presence of CDCA are 8.75, 0.64, 0.66 and 3.7, respectively.