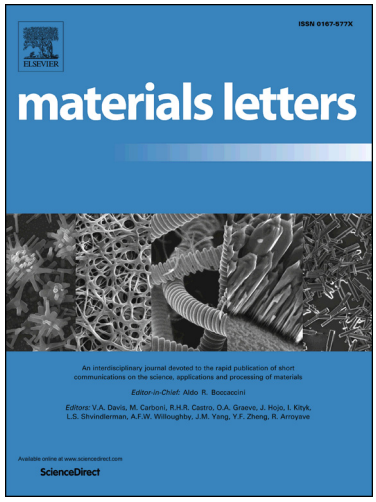

Enhanced performance of sodium doped TiO_2 nanorods based dye sensitized solar cells sensitized with extract from petals of *Hibiscus Sabdariffa* (Roselle)

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Enhanced performance of sodium doped TiO_2 nanorods based dye sensitized solar cells sensitized with extract from petals of *Hibiscus Sabdariffa* (Roselle)

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Abstract:

Sodium (Na) doped titanium dioxide (TiO_2) nanorods were successfully synthesized by one-step hydrothermal method. The effect of sodium doping in improving the performance of dye sensitized solar cells (DSSC) has been discussed. Field Emission scanning electron micrograph (FESEM) revealed the formation of nanorods and nanoflowers for doped samples. X-ray diffraction (XRD) pattern of doped samples reveal slight shift towards lower angle confirming the effective substitution of Ti^{4+} by Na^{+}. The photoelectric conversion efficiency of 6% sodium doped TiO_2 based DSSC was 1.65% and is 79% higher than the undoped TiO_2 based DSSC that exhibited an efficiency of 0.92%. This improvement in efficiency is ascribed due to less electron-hole recombination rate.

Keywords: Dye Sensitized Solar Cells; Sodium-TiO_2; *Hibiscus Sabdariffa*

1. Introduction:

DSSCs have attracted considerable attention in the past few decades as a potential and cost effective alternative to conventional silicon solar cells [1]. DSSCs generally works based on sensitization of mesoporous semiconductor oxide films by suitable dyes and excitation of sensitized molecules by absorption of visible light [2]. Firstly, photoanode plays a vital role in the performance of DSSC. Generally TiO_2 is chosen as semiconductor photoanode due to its wide band gap, non-toxicity and chemical stability [3]. Modification of morphology and composition of TiO_2 is generally implemented to improve the efficiency of DSSC. In the former case, 1D nanostructures such as nanorods, nanotubes, nanowires etc are widely researched as an alternative to TiO_2 nanoparticles. These 1D structures put on display enhanced electron transport phenomena and suppresses the recombination of electron-hole pairs [2, 3].