ENHANCEMENT OF THE PERFORMANCE OF DYE SENSITIZED SOLAR CELLS BASED ON NATURAL PIGMENT EXTRACTED FROM *Carissa carand* FRUIT AND SnO_2 FILMS COATED WITH A THIN LAYER OF SiO_2

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Dye sensitized solar cells, which can be categorized as the second generation of solar cells are low cost energy conversion devices because of its simple fabrication technique in contrast to silicon or other kinds of solar cells that are made using thin film technologies. The efficiency of these solar cells can be increased by improving the properties of the semiconductor material and the dye sensitizer. In this study, we prepared thin films of SnO_2 and then a thin layer of silica (SiO_2) was coated by dip coating the films in a silicic acid solution (H_2SiO_3). The silicic acid solution was prepared by dissolving 1.2 g SiO_2 in 100 ml of deionized water. Silicic acid with high purity was obtained from SiO_2 extracted from rice husk ash. The natural pigment extracted from *Carissa carandas* fruit, which is locally called as "Jamson", was used as the sensitizer in the solar cells. Films of SnO_2 coated with a layer of SiO_2 were characterized with impedance spectroscopic measurements and the fabricated cells were characterized with I-V measurements. The results show that the highest impedance of the composite films could be obtained by dipping SnO_2 films in silicic acid for 10 min and the highest recorded photo current was also obtained from the solar cells fabricated with the above photo anodes. It can be concluded that at this optimum condition, the SiO_2 layer deposited on SnO_2 has the highest capacitive impedance and it suppresses the recombination of photo generated charge carriers injected into the conduction band of SnO_2 films to enhance the photocurrent.

Keywords**:** Dye-Sensitized Solar Cells, silicic acid, composite films, sensitizer, semiconductor, natural pigment, Dip coating

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