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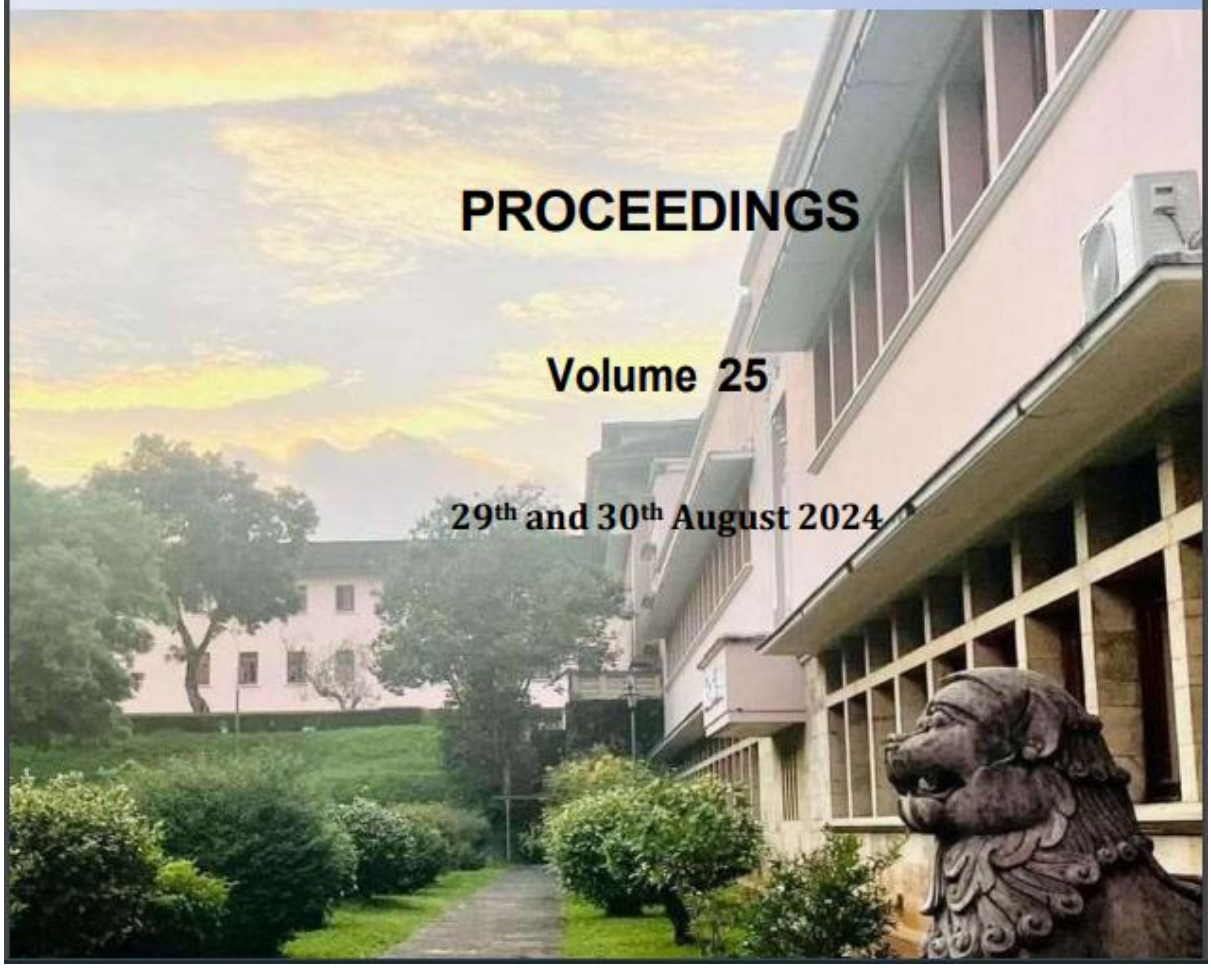

PROCEEDINGS

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Influence of Sintering Temperature of RGO based Counter Electrodes on Efficiency of Cds Quantum Dot-Sensitized Solar Cells (Qdsscs)

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Quantum dot-sensitized solar cells (QDSSCs) have emerged as a promising technology for next-generation photovoltaic devices due to their high efficiency, tunable optical properties, and potential for low-cost production. For QDSSCs to operate at a higher efficiency, the counter electrode (CE) needs to meet a number of requirements. CE should not photo-decompose, compatibility with the polysulfide electrolyte, be highly electro-catalytic and should not dissolve in the electrolyte. For CEs, reduced graphene oxide (RGO) that satisfies all of these criteria is a wise option. The purpose of this work was to determine how the efficiency of QDSSCs is affected by the sintering temperature of RGO-based CEs. Photo-anodes were prepared using CdS QDs deposited using SILAR method. Graphene oxide (GO) was prepared using Modified Hummers method was reduced at 850 °C in a furnace. XRD and Raman spectrum indicated that GO was reduced to RGO. CEs fabricated by spraying RGO on to FTO substrate were subsequently sintered at various temperatures from 150 °C to 250 °C in steps of 50 °C, keeping the sample for 20 min at each sintering temperature. The solar cell efficiency gradually increased up to 250 °C sintering temperature. Beyond 250 °C, the efficiency decreased. This could be due to the structural changes of RGO. The highest PCE of 0.845% was recorded for the CE sintered at 250 °C. The electro-catalytic activity and conductivity of CEs were further elucidated by smaller semicircle in the higher frequency region of electrochemical impedance spectroscopy (EIS) and higher limiting current density of Tafel plot at 250 °C. The morphology of CEs was revealed by scanning electron microscopy images. It was determined that the sintering temperature of RGO based CEs have a significant impact on the performance of the QDSSCs. Further studies are needed to understand the structural changes of RGO with sintering temperature.

Keywords: Reduced Grapheme Oxide, Counter Electrode, Quantum Dot Sensitized Solar Cells.