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Preliminary Studies of Porous GaN based Dye-Sensitized Solar Cells

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This work presents the preliminary studies of porous gallium nitride (GaN) based dye-sensitized solar cells (DSSC). Porous GaN was fabricated using photo-assisted electrochemical etching (PEC), then characterized in terms of its morphological, structural, optical and vibrational aspects. Next, the sample underwent sensitization through immersing in N719 ruthenium based dye for one day. For the DSSC assembly, the dyed porous GaN would serve as anode while platinum (Pt) coated fluorine-doped tin oxide (FTO) glass being the cathode. A thin glass spacer separates the anode/cathode, while triiodide/iodide redox electrolyte would fill the gap between them. Current density-voltage (J-V) curves was obtained under light illumination and used to determine the essential electrical parameters of the DSSC. The open circuit potential (V_{oc}), short-circuit current density (J_{sc}), and efficiency (η) for the aforementioned were 638.8 mV, 0.81 mA/cm², and 0.2% respectively. Aside from that, similar works have been repeated here for as-grown GaN, however, the resultant efficiency was ten times lower than that of porous GaN.