

# Sensitizing performance of extracted natural dyes on MoO<sub>3</sub>-included Degussa composite photo-anode in DSSC fabrication

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## Abstract

Natural dye sensitizers were extracted from *Terminalia catappa* (R), *Azadirachta indica* (G), and *Clitoria ternatea* (B) using water as a solvent to sensitize the bare photo-anodes of N-DSSCs. The average crystalline size of a bare TiO<sub>2</sub>-based photo-anode was compared with a composite photo-anode which includes 1 wt% of MoO<sub>3</sub>. The anchoring capability of extracted sensitizers (R, G, and B) toward metal oxides was confirmed with a favorable functional group. Through UV-Vis-DRS Spectra, the light-harvesting capability to collect light was compared for each composite and a TiO<sub>2</sub>-based photo-anode that had been sensitized with respective sensitizer R, G, and B. The photocatalytic performance of dye-anchored pure TiO<sub>2</sub> and composite-based photo-anodes have been analyzed through recombination rate. Photovoltaic parameters of assembled N-DSSCs were calculated from the *J*-*V* graph. The overall efficiency of N-DSSCs incorporated with 1wt% MoO<sub>3</sub>-based photo-anode sensitized with *Terminalia catappa* (as RB), *Azadirachta indica* (as GB), and *Clitoria ternatea* (as BB) shows diminished results than that of respective pure TiO<sub>2</sub>-incorporated photo-anode-based N-DSSCs.