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Natural sensitizer extracted from *Mussaenda erythrophylla* for dye-sensitized solar cell

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In this study, a natural dye from the flowers of *Mussaenda erythrophylla* extracted separately in ethanol and de-ionized water was employed as a photosensitizer in DSSCs. The quantitative phytochemical analyses were performed on both extracts. The existence of flavonoids (anthocyanin) and chlorophyll a pigments in the ethanol extract of the dye was confirmed by the UV–Visible spectroscopy. The stability study performed on the said ethanol extract confirmed that the dye extracted in ethanol was stable in the dark and did not degrade for nearly 50 days. The presence of the dye molecules and uniform adsorption of them on the P25-TiO₂ surface were confirmed by fourier transform infrared spectroscopy and atomic force microscopy, respectively. Moreover, the influence of dye concentration and pH on the optical properties of the dye was also studied. The natural dye extracted in ethanol was employed in DSSCs, fabricated by utilizing the said dye sensitized P25-TiO₂ photoanodes, I^-/I_3^- electrolyte, and Pt counter electrode. Photovoltaic performances of the fabricated devices were determined under simulated irradiation with the intensity of 100 mWcm⁻² using AM 1.5 filter. The device fabricated with the P25-TiO₂ photoanode sensitized by the dye extracted in ethanol at pH = 5 exhibited the best power conversion efficiency (PCE) of 0.41% with the J_{sc} of 0.98 mAcm⁻² which could be attributed to the optimum light absorption in the visible region of solar spectrum by the chlorophyll a and anthocyanin molecules in the extracted natural dye.