

Fabrication of high efficiency dye-sensitized solar cells by optimizing the Electron Diffusion Length

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The measurement of electron diffusion coefficients and electron lifetimes of dye sensitized solar cells (DSSCs) is essentially required to characterize the cell performance, further investigate high performance solar cells. In this research, stepped light induced transient measurements (SLIM) of photocurrent and voltage is conducted to estimate the electron diffusion coefficients and electron lifetimes of DSSCs. SLIM methods is relatively simple experiment, which can simplify the optical setup and reduce measuring time. In this method, the light having different laser intensity is irradiated to the solar cells with using chopper for lighting on/off. Through measuring the decays of short circuit current and open circuit voltage, the diffusion coefficient and lifetime of photo-generated electron in DSSCs are estimated, subsequently diffusion length is obtained. In this study, the various kinds of DSSCs is fabricated with employing various organic photosensitizer having different molecular structures, and then their electron diffusion coefficient, lifetime and diffusion length are estimated by performing SLIM experiments.