

# Investigation Simulation Based on Bio-Energy Local Area Photosensitizer in Increasing Dye-Sensitized Solar Cells (DSSC) Performance

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## Abstract:

The photosensitizer is an important part of Dye-Sensitized Solar Cells (DSSC). Photosensitizers function like photosynthesis by absorbing sunlight and turning it into energy. Photosensitizers also contribute to the efficiency of improving DSSC performance. This research is a continuation of previous research to find a candidate for natural and environmentally friendly photosensitizer (bio-energy) based local area in Indonesia. The photosensitizer used in this simulation is *Tagetes erecta*, *Nyctanthes arbor-tritis*, *Brassica rapa* Sub. Sp *pekinensis*, *Delonix regia*, *Lawsonia inermis*, *Callistemon citrinus*, and *Daucus Carota*. The purpose of this simulation is finding several candidates for bio-energy local area photosensitizer that produce high efficiency by displaying J-V curves and P-V curves. The highest efficiency was produced by photosensitizer *Tagetes erecta* at 1.5% [Voc 0.6385 Volt, 0.00383 A / cm<sup>2</sup> Jsc, FF 0.605 and Pmax 0.00148 Watt], while the lowest efficiency was produced by photosensitizer *Callistemon citrinus* at 1.1% [Voc 0.6162 Volt, Jsc 0.0032 A / cm<sup>2</sup>, FF 0.557 and Pmax 0,0011 Watts]. These simulation results perform that one of reason give influence at DSSC performance is the absorption coefficient value in each bio-energy local area photosensitizer. The absorption coefficient also determines how much efficiency is produced and how much the photosensitizer's ability to absorb sunlight.

**Keywords:** Absorption Coefficient; Bio-Energy Local Area; DSSC Efficiency; Photosensitizer

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