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A Study on Optimal Dye-coating Conditions to Reduce Dye-adsorption Time with Improved DSSC Efficiency

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Dye-sensitized solar cell (DSSC) has been extensively investigated as the next generation energy source. Despite attractive features of simple fabrication process and its economical efficiency, there are some problems such as low efficiency and low long-term stability. Many groups have attempted the proposed way to improve the cell efficiency and long-term stability such as low recombination rate between TiO₂ surface and electrolyte, the development of new dye molecules capable of light adsorption as broadly as possible, the fabrication of a solid-state DSSC by replacing the liquid electrolyte, and protective coating on glass. In this work, we confirmed new dye-coating conditions to maximize the dye adsorption between the dye and TiO₂ nanoparticle surface. The experiment results coating conditions with the coating temperature of 70°C, the dye concentration of 10 mM and the coating time of 3 min. Conditions have two times, three times cycle the experiment in progress efficiency rises.

Keywords: DSSCs, Dye-coating

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3,6-Carbazole Incorporated into Polymer Effects on Solar Cells

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Bulk hetero junction (BHJ) polymer solar cell (PSCs) is one of the most promising fields as alternative energy source. Especially, the development of new p-type conjugated polymer is one of the main issues to get core technology. In this study, we investigated the chemical doping effects of incorporating 3,6-carbazole units into conjugated polymers based on 2,7-carbazole. We assessed the structural effects of this chemical doping by measuring the photovoltaic device performance of the copolymers with and without annealing. Note that the use of nanostructures in the bulk heterojunction layer could be a major obstacle to commercialization because nano-morphologies are frequently unstable at high temperatures. Therefore, the development of thermally stable polymer:fullerene blends with optimized PCEs is an important goal in this area of research. We studied the morphologies of the copolymers incorporating 3,6-carbazole units resulting from thermal annealing to investigate the effects of the difference between the T_g values of the 2,7-carbazole unit and the 3,6-carbazole unit.

Keywords: solar cell, conducting polymer