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Abstract
In this study, the nanocrystalline TiO2 particles were synthesized by using the sol-gel process, and then TiO2 thin films were coated on fluorine-doped tin oxide (FTO) glass by Doctor blade method. The N3 dye was soaked onto the prepared TiO2 thin film electrode, and the platinum counter-electrode were prepared using the spin-coated method or sputtered method, forming a sandwich structure to pour into the electrolyte for the dye sensitized solar cells. The optimal conditions were systematically studied by using the statistical experimental strategy. The optimal conditions as follows: FTO(10Ω) substrate, 15%PEG content in TiO2 paste, 5μm TiO2 film thickness, MPN as solvent for electrolyte, and the use of hexachloroplatinic acid (H2PtCl6・6H2O) spin-coated method to make Pt counter-electrode. The highest efficiency about 9% was obtained in the system using N3 dye in the optimal conditions. On the other hand, a systematic analysis for pure organic dye system of A, B and C ternary components. The optimal conditions were systematically studied by using the experimental design of mixture design. The optimal composition of dyes was obtained at the B/C mole ratio of 3/1. The highest efficiency about 10.49% was obtained in the optimal conditions.
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