

## Photovoltaic Performance in the Dye-Sensitized TiO<sub>2</sub> Electrode using HPC Binder

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Titanium oxide based dye-sensitized solar cells (DSSC) was fabricated by the use of hydropropylcellulose (HPC) as binder. The formation mechanism of HPC-modified TiO<sub>2</sub> films was studied by FTIR analysis of the sols. It was revealed that HPC anchors on the surface of TiO<sub>2</sub> colloid. The action between the polymers decides the distribution of TiO<sub>2</sub> colloid in the sol. Transmission electrical microscopy (TEM) and scanning electrical microscopy (SEM) showed that the particle size of TiO<sub>2</sub> decreased and the microstructure of the film became loose with the addition of HPC, reaching an optimum when the concentration of HPC was  $5 \times 10^{-3}$  g/g sol. Further addition of HPC made the microstructure became dense. With the increase of the concentration of HPC binder to treat TiO<sub>2</sub> electrode the fill factor (FF) of DSSC increase, the short-circuit current (I<sub>sc</sub>) decreases, the open-circuit voltage (V<sub>oc</sub>) increase. Using HPC binder is advantageous for the adsorption to molecules and enhancement of the photoelectric performance of TiO<sub>2</sub> electrode.