

**Increase the efficiency of dye-sensitized
TiO₂ solar cell (DSSC) by doping on TiO₂
semiconductor**

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In recent, nano-sized TiO₂ powders are used as a working electrode for dye-sensitized solar cell (DSSC) due to its highest efficiency than any other metal oxide semiconductors. However, as reported, the best efficiency of TiO₂ solar cell could seldomly reached more than 10%. It seems that one of possible way to fabricate more efficient cell is enhancement in charge transfer in TiO₂ and the doping would be the most promising solution for that. Therefore, our work has focused on doping on TiO₂ with Al, W. Doped TiO₂ powder was synthesized by hydrolysis reaction with titanium isopropoxide, ethanol and deionized water including dopants. It was found that characteristics of dye sensitized solar cell fabricated with doped TiO₂ were remarkably better than those with pure TiO₂. However, the effects of dopants on cell properties are different from each other. Al-doped TiO₂ electrode had a tendency to increase the open circuit voltage (Voc), but to reduce short circuit current (Isc). On the contrary, W-doped TiO₂ had a reverse effect. It seems that these phenomena were related to formation of deep levels by heavy metal (such as W) and more profound change surface chemistry such as surface acidity by Al. In conclusion, highly efficient dye sensitized solar cell could be prepared by using (Al+W)-doped TiO₂ nano powder.