Localized Surface Plasmon and Reduced Photoanode Bandgap For High Efficiency Dye Sensitized Solar Cell

Dye-sensitized solar cell (DSSC) has attracted considerable attention due to its advantages over the first and second generations of solar cell. Therefore we proposed a dye-sensitized solar cell based on TiO_2 nanocrystal layer to achieve a high surface area of the semiconductor for the loading a large amount of dye molecules and also tailored its microstructure for efficient light harvest through scattering and fast electron transport. The semiconductor Fermi level will also be reduced to for an efficient electron injection from the synthetic dye which ultimately increase the overall efficiency of the photovoltaic Solar Cell. TiO_2 bandgap will be reduced by doping with an optimum amount of Nitrogen using Ammonium salt as a source of N2 to obtain a N doped TiO_2 (N-TiO2) as a photo-anode . Meanwhile, silver nanoparticles will then be incorporated in the photo-anode by using $AgNO_3$ as a precursor and consequently reduce to Ag by using $NaBH_4$ as a reducing agent. Finally complete DSSC will be fabricated and tested. A very efficient DSSC featuring a reduced semiconductor bandgap, improved light absorption by Localized Surface Plasmon (LSP) effect will be achieved.