

High Efficiency Dye–Sensitized Solar Cells: From Glass to Plastic Substrate

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Over the last decade, dye-sensitized solar cell (DSSC) has attracted much attention due to the high solar-to-electricity conversion efficiency up to 10% as well as low cost compared with p-n junction photovoltaic devices. DSSC is composed of mesoporous TiO₂ nanoparticle electrodes coated with photo-sensitized dye, the redox electrolyte and the metal counter electrode. The performances of DSSC are dependent on constituent materials and interface as well as device structure. Replacing the heavy glass substrate with plastic materials is crucial to enlarge DSSC applications for the competition with inorganic based thin film photovoltaic devices. One of the biggest problems with plastic substrates is their low-temperature tolerance, which makes sintering of the photoelectrode films impossible. Therefore, the most important step toward the low-temperature DSSC fabrication is how to enhance interparticle connection at the temperature lower than 150°C. In this talk, the key issues for high efficiency plastic solar cells will be discussed, and several strategies for the improvement of interconnection of nanoparticles and bendability will also be proposed.