

Carbazole-Based Organic Dyes used for the P-type DSSC optimization

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Dye sensitized solar cells (DSSC), which are one of the most promising third generation photovoltaic devices, have been studied extensively. In particular, p-type DSSCs have attracted increasing attention because the combination of n- and p-type DSSCs can lead to a tandem configuration that might be able to break through the theoretical limitation of single-junction DSSCs. In this work, we aim to fabricate an efficient photosensitizing system capable of operating in the long wavelength range of the solar spectrum. The photosensitizer with mono carbazole (MCBZ) absorbed a larger amount of photons with long wavelengths between 400 and 600 nm than C343, leading to much better p-type DSSCs than the conventional C343 sensitized solar cell. Furthermore, double carbazole-based dye (DCBZ) exhibited better photovoltaic performance than the MCBZ dye sensitized solar cells due to the synergic effect of the enhanced electron injection efficiency and reduced charge recombination probability. These findings are expected to have significant impact on the fabrication of high performance photocathodes for p-type DSSCs and cells with a tandem configuration, which can lead to significant improvements in harvesting solar energy.