

Highly Efficient Organic Sensitizers containing Triphenylamine Chromophore for Dye-sensitized Solar Cells

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Organic dyes are suitable as photosensitizers for the Dye-sensitized Solar Cell (DSSC) because they have many advantages, such as high molar extinction coefficients, convenience of customized molecular design for desired photophysical and photochemical properties, inexpensiveness with no transition metals contained, and environment-friendliness. Generally, people know that the efficiency of DSSC based on metal-free organic dyes is much lower than that of Ru dyes, but a high solar energy-to-electricity conversion efficiency of up to 8% in full sunlight has been achieved by Ito et al using an indoline dye. This result suggests that smartly designed and synthesized metal-free organic dyes are also highly competitive candidates for photosensitizers of DSSCs with their advantages mentioned above.

Organic photosensitizers based on triphenylamine with multi-acceptors/anchors chromophores were synthesized and applied to DSSCs.

The judicious choice/design of the donor and acceptors permits the relatively high power conversion efficiency of 4.7 % (TPA3TCN) in organic dye containing cyanoacrylic acid as the electron acceptor.