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Green energy materials: Future prospects and challenges

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Energy demands and environmental issues such as global warming have led to the search for clean renewable energy sources in recent years. In this context, dye sensitized solar cells (DSC's) attracts widespread interest due to their low cost and high performance. Recently, the D-D- π -A type of metal free organic dyes have been reported and show a bathochromic shift, broad and intense absorption in the visible region, as well as better stability as compared with the traditional D- π -A type. These studies suggested that the HOMO and LUMO energy level tuning of organic dyes can be achieved by attaching additional

donor moieties to enhance the whole transporting ability of dyes. Based on the above discussions, triphenylamine, carbazole and phenothiazine based metal free organic dyes with imidazole derivatives as an additional donor were designed, synthesized, characterized and analyzed. This contribution brings further credit to these molecular designs as efficient sensitizers for DSCs, en route for a cheap and less toxic substitute to ruthenium based sensitizers and silicon based photovoltaics as potential eco-friendly energy candidates in future.

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