Contribution ID: **171** Type: **Invited Speaker**

DESIGNING MOLECULAR STRUCTURES OF D-π-A TYPE ORGANIC DYES FOR HIGH EFFICIENCY DYE-SENSITIZED SOLAR CELLS

Monday 28 November 2016 13:20 (20 minutes)

Dye-sensitized solar cell (DSSC) has emerged as one of the most attractive photovoltaic devices because it offers the possibility of low-cost conversion of photoenergy.Ruthenium complex dyes are currently the most efficient dyes. These dyes, however, are costly and hard to prepare in high yields,which have ledto the evolution of metal-free organic dyes.Organic dyes exhibit not only higher extinction coefficient, but simple preparation, structure modification and purification procedure with a low cost. In this talk, an improvement of the performance of the organic dyes as sensitizers for DSSC by fine tuning the dye chemical structures will be presented. A series of organic dipolar compounds forming D-D-π-A type of dyads bearing carbazole-carbazole, carbazole-diphenylamine, carbazole-phenothiazine and carbazole dendrons as D-D moieties were designed, synthesized and investigated. The relationships between structure of these dyes and properties and cell performances will be drawn and discussed. The power conversion efficiencies of the corresponding devices surpass that of the Ru-based device measured under similar conditions, suggesting that the organic dyes based on this type of donor molecular design are promising candidates for improvement of the performance of the DSSCs.

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Session Classification: Heron 1

Track Classification: Nano-electronics/systems