Novel Cyclometalated Ruthenium Complexes & Electrolyte Systems for Dye-Sensitized Solar Cells

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Abstract

Dye sensitized solar cells (DSSCs) have become the focus of significant research efforts in the last two decades because of their fundamental and technological significance as new generation of solar cells. Devising the means for preparing new ruthenium-based dyes that absorb more light in the Near-IR in addition to understanding the processes of light-induced photon-to-current conversion, are paramount for the development of a new renewable energy sources.

In this work we will be synthesizing different cyclometalated ruthenium-based dyes T64-70) and fabricating solar cells using these dyes. The dyes are chemically engineered in a way to harvest more visible light. This will be approached in a way to increase the absorption molar coefficient and extend the absorption into the red for these dyes by the incorporation of a carbon-metal bond within these complexes. Moreover, we will be synthesizing organic soluble thiols/di-sulfides redox couples that can replace the iodide/triiodide couple, since the latter is corrosive and absorbs in the visible region which affects the DSSC's efficiency negatively.