$Cu^{I/II}$ Bis-phenanthroline Complexes as Redox Couples for Dye-Sensitized Solar Cells

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Dye-sensitized solar cells (DSCs) are a promising low-cost solar cell technology that have attracted a significant amount of research interest over the last several decades. Previously, copper(I) polypyridyl complexes have been shown to efficiently perform as sensitizers, enabling low-cost and sustainable DSCs. [1,2] More recently, the incorporation of transition metal complexes as redox couples in electrolytes has gained a lot of attention. Efficiencies of over 14% for $Co^{2+/3+}$[3] and over 10% for $Cu^{+/2+}$[4] based electrolytes have been achieved in combination with organic dyes. Ligand modification of these complexes offer a facile way to tune their reorganization energies and redox potential to further optimize their charge-transporting properties. Here we present a combined computational and experimental study of a series of substituted Cu bis-phenanthroline complexes in DSCs to investigate their intrinsic charge transporting properties.

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