Light-induced electron transfer by Copper(II) complex

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Abstract

Development of renewable energy sources like solar fuels is a crucial issue in the actual context of global warming. Water is an environmental friendly, cheap and abundant source of the electrons and protons needed for fuel production. Therefore, light-activated water oxidation is a key step in artificial photosynthesis and the development of efficient, robust and sustainable catalysts is an important goal for chemists. In this study, we focus on the development of such catalysts based on earth abundant copper complexes. The synthesis and characterization of a monomeric copper(II) complex with tetraanionic chelating ligands N,N'-o-phenylenebis(methylamide) (L1) are described. The electrochemical behaviour of this complex has been investigated by cyclic voltammetry (CV) and electrocatalytic activity for water oxidation was observed.

Photooxidatation of the complex was studied by using Ru(bpy)32+ (bpy = 2,2'-bipyridine) as sensitizer and methylviologen (MV2+) as reversible sacrificial electon acceptor. In addition, the irreversible sacrificial electron acceptors, diazonium and persulfate were used to determine the different mechanism of light-driven activation of the catalyst. The kinetics of the light-driven processes was investigated by laser flash photolysis experiments and kinetic UV-Vis absorption photometry. Ion-pair formation between the oppositly double charged species Ru(bpy)32+ and CuII and MV2+ and CuII was put in evidence.

Keywords: *copper complex, artificial photosynthesis, water oxidation*

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Biography

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