

Environmental chemistry 2020 -Anthraquinone and L-amino Acid Derivatives Schiff Base Cu(II) Complexes as a Mediator between Cathode of Biofuel Cell and Oxygen-reducing Laccase- Yuto Takeuchi- Tokyo University of Science

Yuto Takeuchi

Abstract

Cathode materials of biofuel cells sometimes contain mediator (metal complexes) to enhance electron transfer efficiency between electrode and laccase. Laccase is an enzyme which catalyzes four-electron reduction of oxygen to water. Chemicals of the highest commercial grade available (solvents from Kanto Chemical, organic compounds from Tokyo Chemical Industry and metal sources and MWCNT from Wako) were used as received without further purification. Laccase from *Trametes versicolor* was purchased from Sigma-Aldrich (St. Louis, MO USA). Basically, 2-hydroxy-9,10-dioxo-9,10-dihydroanthracene-1-carbaldehyde was prepared as per the literature method (formylation) with modification of using a Biotage Initiator+ microwave synthesis device in trifluoroacetic acid at 403 K for 90 min. Treatment of 2-hydroxy-9,10-dioxo-9,10-dihydroanthracene-1-carbaldehyde (0.10 g, 0.40 mmol) and NaHCO_3 (0.034 g, 0.40 mmol), and L-alanine (0.036 g, 0.40 mmol)

in a mixed solution of methanol (50 mL) and water (10 mL) at 333 K for 3 hr, copper(II) acetate monohydrate (0.080 g, 0.400 mmol) were added and stirred for 2 hr to give rise to green precipitates to be filtrated and washed with methanol. Complexes 2-4 were also prepared in similar procedures to 1 using L-valine, L-leucin, L-isoleucin, respectively, rather than of L-alanine. UV-vis and circular dichroism (CD) spectra and cyclic voltammogram (CV) were depicted in Supplementary Figures 1 and 2, respectively.

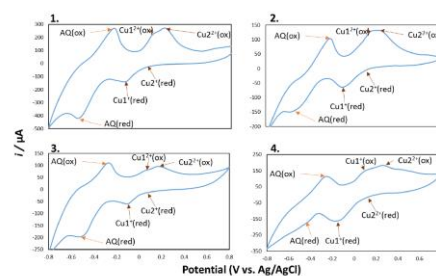


Figure S2 CV (Ag/AgCl, scan rate 0.05 V/s, in acetate buffer pH 5.0, 200 mM) of 1-4.

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Yuto Takeuchi
Faculty of Science, Tokyo University of Science, E-mail: akitsu@rs.kagu.tus.ac.jp