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Electrochemical Characteristics of a 7-Ferrocenyl(carbonyloxy)-1- Heptanethiol-Modified Gold Electrode

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Abstract: The electrochemical properties of 7-ferrocenyl(carbonyloxy)-1-heptanethiol [$FcCO_2(CH_2)_7SH$] were characterized by an electrochemical quartz crystal microbalance (EQCM). A gold surface was modified with $FcCO_2(CH_2)_7SH$ by the self-assembly method. EQCM was used to investigate mass change during the redox reactions of $FcCO_2(CH_2)_7SH$ monolayers on a modified gold electrode in solution containing $K_3Fe(CN)_6$ redox species. The $FcCO_2(CH_2)_7SH$ monolayer on gold acts as a mediator for the electron transfer between a gold electrode and electroactive species $Fe(CN)_6^{3-/4-}$ in solution. In both cases, electrochemical current responses were complicated because the observed currents were due to the redox of both the ferrocenyl group immobilized on gold and others in electrolyte solutions. The interfacial mass change (i.e. frequency change) on the gold electrode surface was observed during the redox of ferrocenyl groups.

Key Words: Electrochemical quartz crystal microbalance (EQCM), surface coverage, frequency, $FcCO_2(CH_2)_7SH$; $K_3Fe(CN)_6$

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