

Electron Transfer Reactions of La@C82-Lipid Bilayer Thin Films on Electrodes

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Metallofullerenes are novel carbon nanomaterials that encapsulate one or more metal atoms inside the hollow of fullerene cages[1]. Although some metallofullerenes are known to be electroactive in organic solutions, to our knowledge, no reports have thus far described the electrochemistry of films of endohedral metallofullerenes on electrode surfaces. We described the stable aqueous electrochemistry of C60 incorporated in films of cationic artificial lipids[2] and in gel-like films of tetraalkylphosphonium[3] on electrodes. We also found that the electrochemistry of a C60-lipid composite film on an electrode was tunable by inducing a phase transition of the lipid bilayer film[4].

In this paper, we describe the electrochemistry of metallofullerenes La@C82-A and La@C82-B embedded in artificial lipid films on electrodes. The cationic lipid used in this study was tridodecylmethylammonium bromide (**1**). The procedure for preparing a modified electrode is as follows. A fifteen microliter portion of La@C82-A (or B)/**1** in *o*-dichlorobenzene was placed on a homemade basal plane pyrolytic graphite (BPG) disk electrode (geometric area, 0.20 cm²), followed by air-drying in vacuum in a glove box. The cyclic voltammetry and differential pulse voltammetry for the modified electrodes were

examined in water containing 0.5 M tetraethylammonium chloride at 25 °C. A saturated calomel electrode (SCE) and a Pt plate electrode were used as the reference and the counter electrodes, respectively. All experimental procedures were carried out in an argon atmosphere.

The differential pulse voltammograms of electrodes modified with La@C82-A/**1**[5] and La@C82-B/**1** electrode showed defined cathodic current at +0.57, +0.37, -0.10 (small), -0.575, -0.875 and +0.525 (shoulder, small), +0.288, -0.162 (small), -0.612, -0.794 (small), -1.148V (small), respectively. Details including the electron transfer mechanisms of La@C82-A and La@C82-B in the lipid films on the electrodes will be reported at the meeting.

References

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