Studies on Electrochemical Sensor Based on Stainless Steel Supported Bilayer Lipid Membrane

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Bilayer lipid membrane (BLM) supplied people with a simple biomembrane model, which made probing the unique mechanism of metabolism, mass transport, electrical signal transmission, or energy transformation in living organisms much more convenient. A bilayer lipid membrane is formed from two layers of amphiphilic lipid molecules, in which one part of lipid molecules aggregate, which is the driving force of the self-assembly of such structures in aqueous solution. The first artificial BLM was reported in the beginning of 1960s(1). Since then, the studies on the properties and application on BLM such as in biomembrane simulation (2), electron transfer (3), electrochemical sensor (4-6) and molecular devices(7) etc., were often reported. In the present work, the electrochemical behavior of stainless steel supported BLM (s-BLM) embedding Fullerene or iodine were studied. The results showed that the s-BLM embedded C_{60} or C_{60}-I_2 mixture could dramatically increase the response sensitivity of the system to I^-. The proper inlays could evidently improve the stability of the s-BLM elelctrode. The detection limit got up to 10^{-7} mol • L^{-1}.

A three- electrode system is used. S-BLM was used as working electrode. A saturated calomel electrode was used as the reference electrode, vs. which potentials were reported. Platinum foil was used as the auxiliary electrode. All the tests were made at room temperature.

The Cyclic Voltammograms for the s-BLM with different inlays were showed in Fig.1. The current dependence on the concentration was showed in Fig.2. The dependence of slopes for straight lines of Concentration-Current on potentials is very good linear,seen in Fig.3.

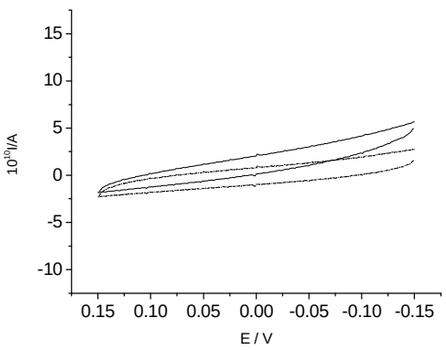

Fig.1. Cyclic Voltammograms for the s-BLM embedded with C_{60} and I_2

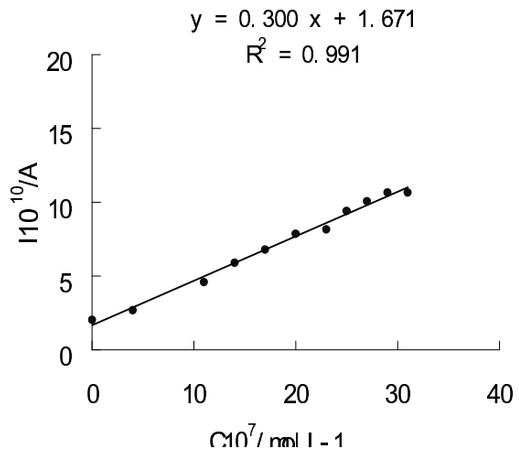

Fig.2. Concentration-Current Curve of s-BLM embedded with C_{60} and I_2

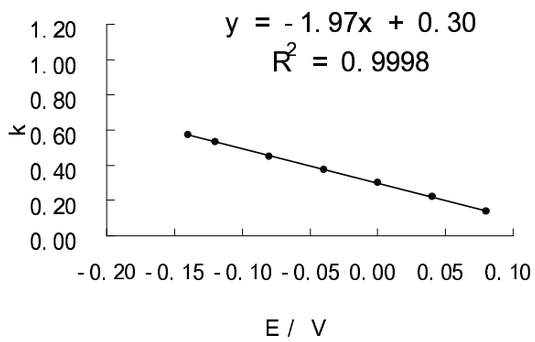

Fig. 3. k－E curve of s-BLM embedded with C_{60}-I_2 mixture.

ACKNOWLEDGMENTS

We gratefully acknowledge support of the National Natural Science Foundation of China (No.20073003) , the Research Fund for the Doctoral Program of Higher Education of China (No.98000117), the Fund of Postdoctoral Scientific Research of China.

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