APPLICATION OF GRAPHENE TRANSDUCING LAYER IN ALL-SOLID PB^{2+} SELECTIVE ELECTRODE

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Abstract: *at present, the problem of water and metal pollution in China is becoming more and more prominent. Among them, the problem of lead pollution cannot be neglected, and it is particularly important to select an appropriate method to detect the content of heavy metal lead ions. In this paper, Graphene was used as solid-state transfer layer to prepare all-solid ion-selective electrode for analysis of heavy metal lead ions.*
Keywords: *all-solid ion selective electrode; solid-state contact; Graphene; Pb^{2+}*

With the advent of the 21st century, the speed of industrial development is getting faster and faster. However, a series of problems have also arisen. Especially the problem of heavy metal pollution. It results in a series of problems affecting human life and health. Accurate detection of heavy metal ion concentration, and control of heavy metal ion content, have become an important task in environmental protection and human health.

Compared with the traditional method for detecting heavy metal ions, Electrochemical analysis has the advantages of rapid detection and analysis, low requirements for experimental operators, low price of detection instruments, rapid real-time monitoring, wide application range, and the ability to realize on-site and online portable detection. Therefore, more and more researchers prefer to electrochemically detect heavy metal ions.

In today's society, electrochemical ion sensors are widely used in the detection of heavy metal ions. The test principle is to convert the activity of the ion to be measured into a measurable electromotive force, and it follows the Nernst equation, thus we can obtain the ion concentration in the measured sample. However, the conventional liquid-connected ion selective electrode has a series of defects, coated wire electrodes show long-term potential instability, which is attributed to the lack of a well-defined interface between the ionically conductive sensing membrane and the electronically conductive conductor and the formation of a thin water layer between them. By incorporation of appropriate redox-active compounds to the all-solid ion selective electrode membranes or using conducting polymers such as polypyrrole, poly(3-octylthiophene),polyaniline and poly(3,4-ethlyenedioxythiophene) as solid contacts, the potential stabilities of all-solid-state ion selective electrode can be largely improved. However, these methods may still suffer from problems of the presence of the water layers, undesired side reactions with redox interferences and sensitivity to light, dissolved oxygen and CO_2.It is therefore highly desired to develop alternative materials as solid contacts in order to obtain stable and reliable potential responses for all-solid ion selective electrode. So the all-solid ion selective electrode is gradually recognized by everyone. Among them, Graphene material is widely used in solid-state transfer layer. Due to the large double layer capacitances and hydrophobic properties of Graphene, these all-solid ion selective electrode possess high potential stability, and show the absence of an interfacial aqueous layer between the polymeric sensing membrane and the underlying solid contact. In addition, Graphene based all-solid ion selective has excellent resistance to O_2, CO_2, light and redox interferences. Therefore, Graphene have become more attractive as solid contacts for fabricating all-solid ion selective.