

First Laureate Fundamental Research

- **Research Work Title:** Development of knowledge of electrochemically modified sensors, immunosensors and aptasensor
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Abstract:

Due to recent advances in medical science and biotechnology, as well as increasing attention to the hygiene and health of human beings, the need for measuring small quantities of pharmaceuticals, biomarkers and environmental species have been dramatically increased. In this research work, different metal nanoparticles, nanocomposites, organic modifiers, polymers, DNA, antibodies and nanomaterials were used to develop and modify a variety of sensors based on carbon materials and ionic liquids. The electrochemical sensors, compared to the expensive and complicated analytical methods, have been the subject of increasing attention, and their application has grown specifically in environmental, medical, agricultural and industrial laboratories. Introduction of new electrochemical sensors is important for improving the response of the sensors for particular species and enhancing their efficiency. Electrochemical sensors based on modification of the electrode surface have the ability to accomplish different objectives. In this project, we have evaluated the performance of these sensors for various applications including sequence detection, defects, mutations and hybridization in DNA, detection of cancer markers and tumor cells, antigen-antibody interactions, investigation of the effect of drugs on biological processes, determination of drugs in real samples such as blood, urine, and measurement of various pollutants. These electrochemical sensors generally provide appropriate analytical response characteristics and some of them have a great potential for application in pharmaceutical, medical and environmental researches. Development of technical knowledge and expertise in this field enables the production and commercialization of some of these sensors with a reasonable cost. This will play a significant role in the rapid prevention, detection and treatment of the diseases, with the aim of promoting health, increasing life expectancy and reducing costs and moral damage to the society.

