Biosensor Research Center
Endocrinology and Metabolism
Research Institute, Tehran University
of Medical Sciences

The Biosensor Research Center is one of the three centers affiliated with the Cell and Molecular Sciences Research Institute, under the Endocrinology and Metabolism Research Institute of Tehran University of Medical Sciences and Health Services. It initially began its activities as the 'Biosensor Group' in 2008 and was upgraded to the Biosensor Research Center in 2012.

This research center specifically focuses on the design of diagnostic and therapeutic methods for endocrine and metabolic diseases. The goals of this center include collecting, organizing, and classifying relevant documents, articles, and materials; training researchers in the field of biosensor and nanobiosensor design for the detection and measurement of analytes; and encouraging, promoting, and involving researchers, as well as striving to attract attention and cooperation from relevant research and operational centers both domestically and internationally.

Establishing and strengthening interdisciplinary communication, along with applying the results of basic research, are key advantages of this research center. In recent years, with the design of intelligent nanobiosensors, the sensitivity of measurement methods has significantly increased. These methods can not only assist in research on the unknowns of biological and medical sciences, as well as the mechanisms of certain diseases and disorders, but also in the diagnosis and treatment of diseases and their complications, identifying the causes and backgrounds of these conditions. Additionally, they can be applied in other related fields such as pharmaceuticals, advanced drug delivery systems, the identification of new drugs, and the evaluation of their biological activity

Biosensors:

Biosensors are a group of measurement systems designed based on the selective identification of analytes using biological components and physical or chemical detectors. Biosensors can be classified based on the nature of the biological sensor and the operating mechanism of the transducer. In addition to conventional classification systems, terms such as immunosensor and genosensor are often used to specify the diagnostic mechanism of a biosensor or the nature of the target molecule.

Point of Care Testing (POC):

Point of care testing systems are simple, sensitive, specific, and cost-effective systems capable of identifying biological markers at home, in a doctor's office, at the patient's bedside, or even at the workplace. The design and development of such tests are crucial for the proper management of diseases and the selection of appropriate treatments. These tests are of particular importance, as in many disorders, the levels of biological markers in the early stages of disease are often below threshold concentrations, making detection with conventional laboratory methods often unfeasible. High-sensitivity POC tests allow for the early detection of diseases and the assessment of disease recurrence after treatment.

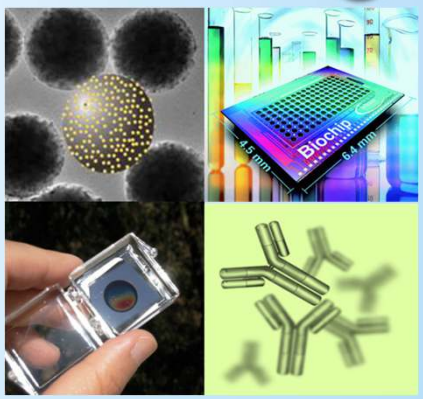
Research Projects of the Biosensor Research Center:

1.Design of Various Biosensors and Smart Nanobiosensors:

1. Immunosensors based on nanomaterials
2. Enzyme-based biosensors utilizing nanomaterials
3. DNA biosensors and various nanomaterial-based genosensors
4. Nanomaterial-based biochips

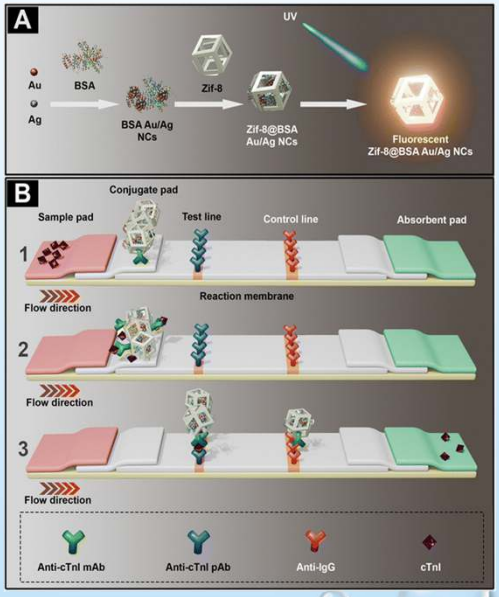
2.Design of Smart Biosensors and Nanobiosensors for Theranostics

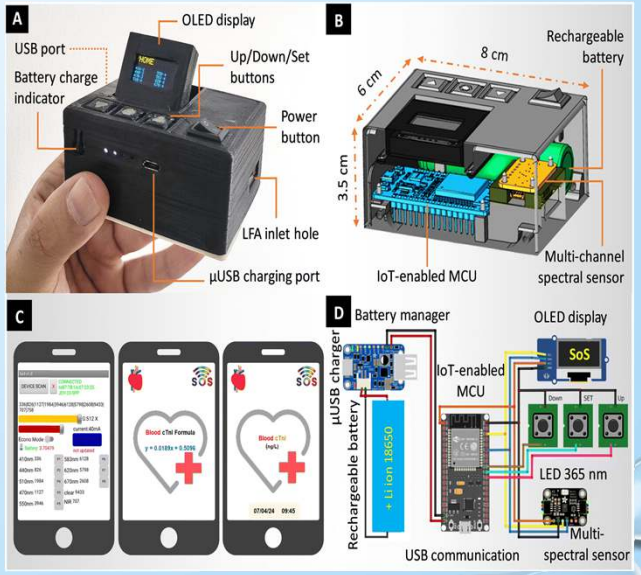
With the aim of simultaneous diagnosis and treatment



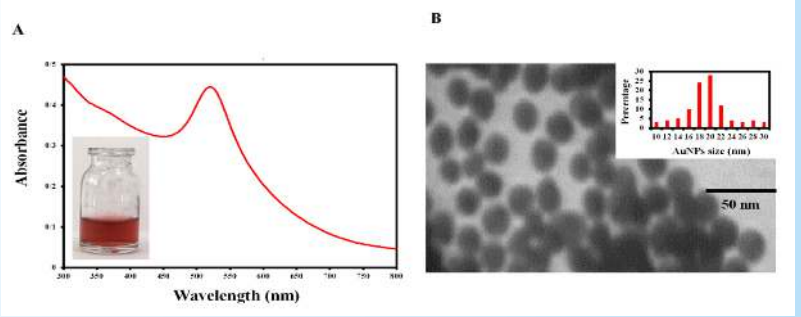
Among the successful biosensors designed by this center, the following can be mentioned:

Development of a smart detection system based on lateral flow and fluorescence monitoring for the identification of cardiac troponin in whole blood



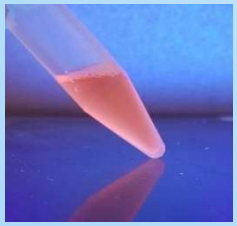


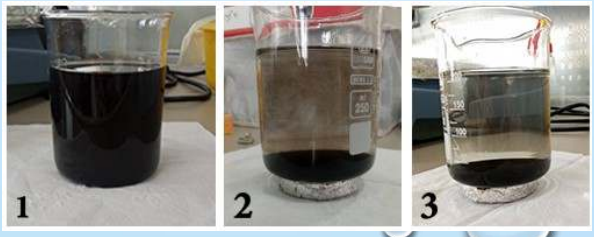
In addition to research focused on biosensors, significant efforts are also made to expand fundamental and applied research, as well as to establish and strengthen interdisciplinary communications and provide suitable diagnostic and therapeutic solutions in various other fields.



- Immunochemistry and Related Technologies:
- Immunoassays
- Immunocytochemistry
- Design of rapid tests
- Nanomaterial fabrication

(Nanoparticles, nanorods, gold, iron, iron oxide, zinc oxide, titanium oxide nanoparticles, and polymeric nanofibers)





Active Laboratories at this Center

Modeling and Simulation - Laboratory in Medical Sciences

Nanobiosensor Laboratory -