

## DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

Latest research shows that cells release small membrane-protected vesicles called exosomes to the surrounding medium. Exosomes emerge as an efficient carrier of the cell-to-cell communication while transporting rich cargos of proteins, lipids, DNA, and RNA. Exosomes are also able to penetrate the blood-brain barrier. Therefore, owing to these natural properties, exosomes become one of the best candidates for the potential diagnostic biomarkers and nanocarriers for new targeted drug delivery systems.

This Project is focused on design and test of electrochemical, piezoelectric and fluorescence genosensors, immunosensors and microfluidic systems for the detection of exosomes isolated from cancer and normal cell lines. The investigations will also involve studies of the upload of potential drugs to exosomes which upon crossing the blood-brain barrier can interact with the lethal forms of brain tumor providing novel means of cancer treatment. In the Project, the integration of novel exosome biosensors with a microfluidic system as a novel tool for cancer and neurological diseases screening and diagnostics will be performed. The exosome biosensor devices will enable the development of targeted exosomal drug delivery providing protection of healthy cells against highly toxic chemotherapeutic drugs..

During this Project, the mechanism of generation of analytical signals arising after antigen-antibody binding and complementary oligonucleotides' hybridization will be assessed and exosensors optimized.