The primary goal of this work is design, synthesis and physicochemical characterization of the novel fluorescent biosensing system based on quantum dots (QDs) functionalized with nucleobases.

Quantum dots (QDs) are one of several types of nanomaterials that have a significant impact on research in many fields across the chemical, physical, biological and medical sciences. In comparison with organic dyes they have unique optical and electronic properties including photostability, broad absorption spectra, narrow and size-tunable emission bands, resistance to photobleaching and longer fluorescence lifetime**.** The term biosensors can be defined as a small devices aimed at detection of target analytes that are usually biomolecules such as peptides, proteins, nucleobases and nucleosides.

Based on their unique luminescent and physical properties, QDs can be used to construct novel biosensor systems. QD-based biosensors can be used for the selective, rapid and accurate detection of biological macromolecules or molecules of low-molecular-weight compounds. The abnormal level of the nucleobase/nucleosides in organism suggests the deficiency and mutation of the immune system what may be indicative for various diseases. The higher than normal level of their concentration is considered to be an important parameter for diagnosis of cancers, AIDS and progress of disease while its steady and controlled decrease may indicate success in therapy. Therefore, the analysis of these nucleobases/ nucleosides is of great significance to bioscience and clinical diagnosis.

The approach proposed in a current project meets the needs of development of novel fluorescent biosensors for selective detection of nucleobases/nucleosides in the body fluids.

Novel types of florescent conjugates based on cadmium telluride QDs and thymine/guanine (CdTe QDs-thymine/guanine) will be synthesized and tested. It is postulated that based on the specific interaction between complementary nucleobases it will be possible to control the fluorescence changes. Furthermore, selective determination of the concentration of nucleobases/nucleosides will be possible. Figure 1 demonstrates the proposed mechanism of functioning of novel fluorescent biosensor based on complementary nucleobases and their derivatives.

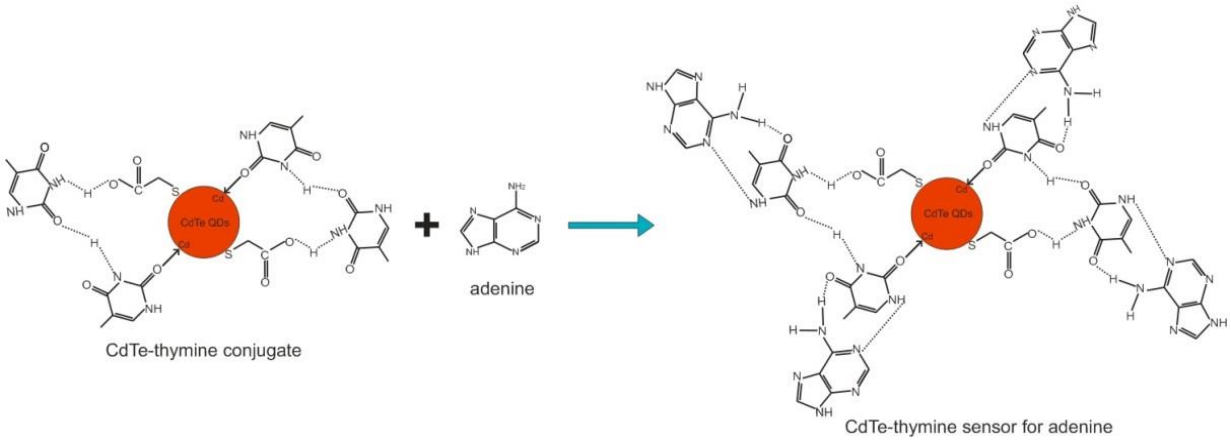

Fig.1. Schematic presentation of sensing system based on fluorescent QDs-thymine conjugate

In order to evaluate the medical applicability of the proposed novel biosensor it is planned to determine the selectivity of complementary nucleobase detection in a presence of various substances. Finally, the ability of CdTe- base conjugates for the selective detection in a medium mimicking the biological fluids (e.g. simulated urine) will be assessed.