Description for the general public

TITLE: Investigation of charge recombination in photosynthetic reaction centers from *Rhodobacter sphaeroides* **and characterization of factors determining the rate of this reaction.**

Photosynthesis has fascinated humanity for centuries. Every day we can observe the necessity of photosynthesis process. We can say that photosynthesis is the basic biological process that determines life on Earth and important process of producing organic matter from the inorganic. The investigation of this process is very attractive area of research work for scientists of various specializations.

Photosynthesis is the process by which plants, some bacteria and some protistans converts solar energy into chemical energy using electrons and protons from water. Purple bacteria or purple photosynthetic bacteria have been fully characterized so in terms of energy collection and primary transfer processes, are the best known photosynthetic organisms. Photosynthetic reaction center from purple bacterium *Rb. sphaeroides* will be used as a model system to explore common mechanisms controlling electron transfer dynamics inside the protein. Electron transport will be observed by using the optical methods: light absorption and fluorescence following excitation of the reaction centers by short laser pulses.

In this project, in order to check how the protein dynamics influence the electron transport, we will try to modify these dynamics through (a) replacement of certain parts of the protein (amino acids) by others, (b) changing the temperature, (c) introducing an extra electrical charge to the protein interior.

We predict that the results of this project will contribute significantly to better understanding of this mechanism. A new insight into the physics of electron transfer inside the protein may have sound consequences in such divers fields as photovoltaics (prototype solar cells built from biohybrid materials) or medicine (functioning of the enzymes, in which essential role is played often by electron transfer).