The accelerated rate of our civilization's development as well as dwindling stocks of fossil fuels show that the increase of 'green' energy production and energy utilization management are *condiciones sine quibus non* for the further economic growth worldwide. It is now clear that in the not-too-distant future it will be essential to shift the global energy production into the use of the environmentally friendly renewable energy sources, of which solar is the most abundant contributor. Artificial photosynthesis is a promising approach to tackle this grand challenge by means of supplying carbon-neutral solar fuels, such as hydrogen, by conversion of practically unlimited and inexhaustible solar energy using water as the sole electron source.

The fundamental process of photosynthesis has been optimized by nature for over 3.5 billion years of evolution. It is directly responsible for all the air we breathe, all the food we eat and all the fuel we burn. Artificial photosynthetic devices aim to mimic the early events of natural photosynthesis ultimately using the simplest substrates, i.e., water and atmospheric CO_2, to produce carbon-neutral solar fuels and other high value products. Rational design of such devices requires efficient interfacing of the natural or synthetic photoelectroactive and catalytic systems within 'smart matrix' which should ensure not only the stability of the working modules but also their tight intra- and intermolecular electronic interaction upon absorption of solar light.

This highly interdisciplinary project sets out to develop a new class of efficient and viable biophotoelectrodes with significantly improved power conversion output by synthesis and application of a universal chemical platform for electronic and structural interfacing of the robust biological photoconverting component, photosystem I, with various types of conductive electrode materials. It is anticipated that the results obtained in this project will lead to the development of a universal chemical platform for efficient interfacing various (bio)molecular components which require a high degree of precise molecular organization within various types of biosolar cells, solar-to-fuel devices and biophotosensors.