This research project is related to organic synthesis, photovoltaics and organic electronics. The first of these disciplines deals with designing novel and developing well-known methods of the synthesis of chemical compounds possessing expected properties. On the other hand, photovoltaics is concerned with the conversion of solar energy into electric current, while aim of the organic electronics is the construction of organic diodes - systems emitting light when the electric current is passed through them. Photovoltaics and organic electronics are modern fields of knowledge and technology, which influence everyday life when using smart phones, tablets and various types of renewable energy sources. For further development of these devices and technologies on which they are based, the progress in the area of new materials (*e.g.*, conducting polymers, light-emitting materials) with expected properties is necessary, which requires the progress in organic synthesis. The continuous technological progress requires basic research aimed at designing and synthesizing new materials and their precursors (chemical compounds) as well as comprehensive studies of novel intermediate and final products. The studies of this type are interdisciplinary in their nature, combining the elements of chemistry (organic chemistry, catalysis, organic synthesis, computational chemistry), material science and physics (including physics of high pressure). The main purpose of this project is to synthesize a series of properly designed chemical compounds having a joint property (structural feature), namely compounds which are derivatives of perylene - compound made up of several aromatic rings. The presence of benzoperylene structural motifs and other structural features will allow to control (or even tune their properties to meet expectations), *e.g.*, conductivity or the ability to emit particular color of light. Many compounds to be synthesized will constitute a donor-acceptor system wherein one fragment of these molecules plays a role of an electron donor, while other part is an acceptor of electrons. Among the designed compounds there are molecules capable of combining metals (ligands), the others conducting electricity (so-called "artificial metals") and finally and the most importantly, compounds which are able to convert different types of energy to light. These systems (chemical compounds) will be synthesized by applying the latest results in chemistry, organic synthesis and physical chemistry (with the support of physics and theoretical chemistry), *i.e.*, fields of knowledge and chemical practice that allow to design practically any chemical structure. It is planned to synthesize the above described chemical structures using one of cycloaddition reactions, called Diels-Alder reaction, after the names of its inventors (who were awarded Nobel Prize for this discovery). This reaction, which became one of the fundaments of modern chemistry, organic synthesis in particular, allows to combine simple substrates into more composite systems selectively (in scheduled way) and with high yield. All the Diels-Alder reactions planned in the project will be performed under high pressure, as a factor which activates the substrates, without using chemical activators, therefore this strategy is environment-friendly. It will allow to spectacularly increase the reaction rate, synthesis efficiency and to conduct such syntheses which are impossible under normal conditions. Thermal reactions (without high pressure activation) will be also realized but only as reference reactions (*i.e.*, comparable). All the synthesized chemical compounds, potential light-emitting nanomaterials and "building blocks" used for the synthesis of "artificial metals" will be then thoroughly studied with regard to their physicochemical properties (useful for future applications). Importantly, it is planned to test the attractiveness of the obtained compounds from the perspective of OLED and OPV technologies. Thus, properties crucial for the technologies will be examined and prototypes of the devices will be constructed. Knowledge concerning the relation between the structure, reactivity and expected properties will be gained on the basis of the results of the syntheses, theoretical calculations, comprehensive examination of properties and pre-application tests. The outcome of the project will be useful for specialists in chemistry and chemical technology, technology of materials and organic electronics who would like to perform advanced application tests, create and test ready-made devices. The authors of this interdisciplinary project represent research groups specializing in different fields of chemistry, physics and materials chemistry. The realization of the project will stimulate the cooperation between them and their personal scientific development. Most of all, it will broaden the knowledge on the Diels-Alder reaction - one of the fundamental synthetic methods of carbo- and heterocyclic systems known, developed and widely used in modern science, chemistry in particular and modern technology, especially in organic electronic.