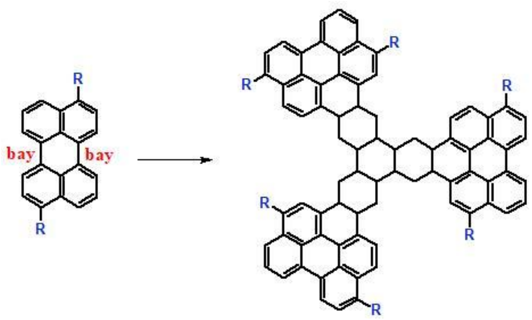
Nowadays, science and technological progress somehow ”forces” scientists to constantly searching for novel, more efficient materials that can be used for the specific purpose. Undoubtedly, one of the most dynamically developing fields of technology is organic electronics. This branch of technology is inextricably linked to design and synthesis of new organic molecules, which, as consequence, can be used among others as conductive films in OLED, OFET or OPV devices. When it comes to OLED devices, we deal with them on a daily basis and, it is safe to say, that this is the technology of the future. The origins of this technology date back to 1987, when the prototype of OLED was constructed. Currently, the market of electronics is totally revolutionized not only by small-size displays in such devices as mobile phones, smart watches, wristbands, tablets, but also TVs and lighting (e.g. car lights). This project is devoted to the synthesis of new extended perylene derivatives, which could be considered as nanographenes with potential application in organic electronics. Compounds of this type exhibit excellent photophysical properties, thanks to which they could be applied in organic electronic devices. Perylene is a molecule belonging to the so-called PAHs (polycyclic aromatic hydrocarbons) – group of compounds composed of rings consisting of carbon and hydrogen atoms. Perylene derivatives (perylene with different groups attached to main core, e.g. substituents that improve the solubility of final products) are meterials of particular interest in various branches of optical technology. These compounds exhibit high luminescence efficiency and behave as n-type organic semiconductors, so it is possible to used them in fabrication of photovoltaic devices or before-mentioned OLED devices. One of the most promising method for the synthesis of extended PAHs is Diels-Alder cycloaddition to the bay area of them – such synthesis can be compared to arrangement of Lego bricks: to the basic “block” of perylene, subsequent elements are added and, consequently, the desired structure with specific shape and properties is obtained. The expansion of the perylene core in bay position leads to more complex polycyclic aromatic hydrocarbons (PAHs) derivatives, which can be considered as functionalized nanographens – it is in the form of carbon structures (graphene and its nano-size siblings i.e. nanographenes) the PAHs chemistry, known from the beginning of XX century, is nowadays flourishing. To pre-determine the properties of the target compounds and better understanding of experimental results, the in-silico tests (calculations made using computer) will be carried out (such calculations seem to be essential for precisely tuning of target materials’ properties).The project goals will be realized in the cooperation with the scientists from different research groups (from the area of organic chemistry, catalysis, coordination chemistry, theoretical chemistry, physics and materials science), as required by the interdisciplinary character of the studies.



Scheme 1. Exemplary reaction of perylene core extension