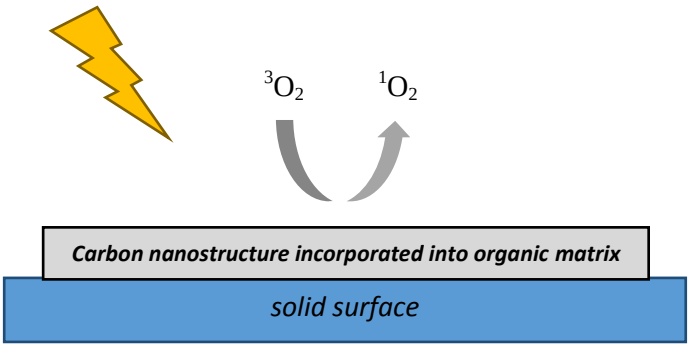
DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

Carbon can exist in several allotropic forms, of which diamond and graphite are well known since ages. Other carbon allotropes discovered much later, with fullerenes, carbon nanotubes and graphene have gained much scientific interests mainly for the application in electronics. Lately, it has been also shown that those nanostructures can act as photosensitizers, i.e. absorb energy from the light and transfer it to another molecule. The most interesting for this project is the photoreaction in which carbon-based materials absorb certain radiation and transfer it to triplet oxygen forming singlet oxygen molecule ($^1O_2$). This molecule due to its strong oxidizing properties can be applied as anti-cancer species, antimicrobial species, in the synthesis of fine chemicals (medicines, cosmetics etc.) or in the wastewater treatment.

In the presented project the thin films of photoactive carbon nanostructures incorporated into organic matrix will be synthesized. Organic units will act not only as the support for fullerenes, nanotubes or graphene, but will also act as the *antennas* absorbing light with different energy and transferring it to photoactive carbon form. Thus, the spectroscopic properties of the formed nanomaterials can be tuned, so that more of absorbed light results in the generation of singlet oxygen.



The photoactive carbon-based nanomaterials will be synthesized mainly in the process of electrochemical polymerization. Their physicochemical properties will be studied by means of electrochemical (cyclic voltammetry), spectroscopic (XPS, Raman) or microscopic (SEM, TEM) techniques. The effectiveness of singlet oxygen generation will be determined with common $^1O_2$ – traps and in various industrially important oxidation reactions.

It is believed that the presented approach in the photogeneration of singlet oxygen should result in the formation of solid materials exhibiting high yield of $^1O_2$ generation, that can be applied in heterogeneous synthesis of fine chemicals or wastewater treatment.