DESCRIPTION FOR THE GENERAL PUBLIC (IN ENGLISH)

Crude oil, called rock oil, is oily liquid lighter than water. It consists mainly of natural hydrocarbon gases, liquids and solids. It has a distinctive odor, does not dissolve in water and is flammable. Oil deposits occur at great depths beneath the sea and on land. Oil as one of the most important energy resources, is essential for the global economy and as a raw material in chemical industry.

Due to the presence in its composition difficult to decomposition and toxic hydrocarbons, petroleum and its derivatives pose a serious threat to the ecosystem. Particularly dangerous is so called "the uncontrolled release of petroleum compounds into the environment", as a result of accidents, disasters or human mistakes. **To ensure the highest possible safety and environmental protection, it is necessary to efficiently eliminate hydrocarbon contamination.** Conventional methods consist of the removal of contaminated soil and addition to the loss with soil with a similar geological profile, but the process is expensive and inefficient.

Responding to the need to develop modern methods of removing the hydrophobic compounds technology that uses microorganisms to break down pollutants has been developed – the bioremediation. This technique does not require the use of complicated devices and may be used in place of the contamination occurrence (in situ). Due to the beginning of the application of microbiological degradation of oil pollution in the 90s of the 20th century, many aspects of its control mechanism are not completely understood and characterized.

One of the issues, not described so far, is the importance of soil, which in the case of hydrophobic contaminants, becomes their carrier. **The subject of cutting-edge research conducted within the project will be the characteristics of different carriers of hydrophobic contaminants and determination of interactions between the matrix particles and microorganisms used in bioremediation.** The research will examine the interaction of the soil and microorganisms with straight-chain hydrocarbons (C8-C16) and benzene derivatives, because these components are main fractions of petroleum derivatives, and their interaction with the soil particles has not been investigated yet. Additionally the properties of the novel silicone carrier as a model system used in further studies will be described. For the research advanced analytical techniques will be used, such as gas chromatography GCxGC TOF-MS and microscope analysis, e.g. scanning electron microscopy (SEM) and atomic force microscopy (AFM). In addition, innovative analysis will be conducted to specify the changes occurring on the surface of microorganisms and to investigate the molecular basis of this modification in microorganisms used in ongoing work. **Understanding the relationships in a medium / hydrophobic pollution / microbes system will expand knowledge about the basics of bioremediation process. This can have a direct impact on the development of purification of contaminated land research.** It should also be noted that the subject of the work undertaken in the project fits into the trend of extensive research in order to create environmentally friendly technologies.