The main goal of the project is to answer the question of whether it is possible to reduce the stream of micro-particles of plastics discharged into the aquatic environment only using advanced oxidation or in combination with the phytoremediation step. Microplastics are ubiquitous in virtually all elements of the environment. They are found in marine and fresh waters, bottom sediments, soils, beach and desert sands, airborne dust and even in arctic areas. Environmental plastics vary significantly in shape and size, most commonly in the form of fibers, particles or spheres. The quantities determined also vary greatly (e.g. 15-9,400 particles/m^3, mainly crumbs, spheres and films in the 50-100 µm range) and depend on the way they are captured (mesh size of the sieves, nets and flirts used) and the separation technique from the taken samples. The massive presence of plastic in our environment has a serious impact on it and the organisms living in it. The most noticeable effects are the accidental ingestion of large pieces of plastic by fish, birds or marine mammals, leading to abrasions or even obstruction of the digestive tract which frequently resulted in the death of the animal. However, this is not the only effect of the presence of plastics in the environment. Micro-plastic particles transported by sea and ocean currents simultaneously carry organic pollutants and metal ions adsorbed on their surface. Another problem is the inclusion of micro-plastics in the food chain and the potentially harmful impact of monomers and additives released during the digestive processes, used in their production to obtain appropriate functional characteristics. Pioneer organisms colonizing plastic particles in the aquatic environment are bacteria. The bacteria-colonized particles are then inhabited by algae. Consumed by zooplankton or herbivorous fish, they get to higher and higher links of the trophic chain. Microplastics are currently found not only in the tissues of fish and seafood or table salt, but also in plant products from land crops. It is estimated that Americans consume between 39,000 and 52,000 particles per year through food. However, it is believed that when introduced into the digestive tract, they may be degraded into shorter chains under the influence of enzymes, releasing additives and absorbed xenobiotics. Chronic exposure to such a "cocktail" can lead to several adverse physiological reactions, ranging from oxidative stress to the initiation of neoplastic processes. Due to the negative impact of environmental plastics on the health condition of organisms inhabiting a given area, intensive measures should be taken to reduce the load of plastics in the environment. Both municipal and industrial wastewater treatment plants are indicated as the main point sources of micro-plastic emission into the aquatic environment. Studies show that up to 99% of various types of micro-particles are removed during wastewater treatment. However, due to the amount of wastewater produced, the amount of micro-particles emitted to the environment from the treatment plant creates a huge flux estimated at over 1,000 million micro-particles per year. Traditional wastewater treatment plants have not been designed to remove micro- and nanoplastics. Therefore, it is extremely important to take measures to limit the flow of plastic micro- and nanoparticles into the environment. In the presented project, it is planned to use chemical methods - advanced oxidation processes based on the action of hydroxyl, carbon centered (products of peroxyacetic acid decomposition) or carbonate radicals to degrade microplastics to smaller fragments, and in the final stage to water and CO_2. Peroxyacetic acid and sodium percarbonate activated by physical or chemical factors will be used as sources of radicals. The choice of these reagents is due to their high redox potential and pro-ecological nature. Their use does not generate new waste but leads to the formation of acetic acid or carbonate ions. In the second stage of the project, the susceptibility of chemically digested plastic particles to enzymes secreted by selected species of green algae (e.g. Chlorella vulgaris, Scenedesmus quadricauda) will be checked. It is assumed that the biodegradation of chemically digested particles will be significantly accelerated compared to the time needed to colonize undigested particles. The expected effect of the project will be new knowledge on the mechanisms of chemical and biological degradation of plastics, an assessment of the suitability of advanced oxidation processes for their removal and the possibility of combining the potential of microorganisms and chemical processes to remove persistent pollutants such as plastic residues in the environment.