

Wet wipes have become an increasingly popular item of everyday use in homes, workplaces, and especially during travelling. They were originally offered as personal care baby products. However, their success has led to the development of many products with household and industrial applications for cleaning, sanitizing and polishing. The wet wipes are designed to be durable enough for duty cleaning tasks, yet still be disposable. The materials used for produce the wet wipes are fibers such as cotton and rayon, as well as synthetic polymers like polyester, polyethylene, and polypropylene. A cleaning lotion, typically consisting of an aqueous emulsion and surfactants, is applied to the material to create the wet wipes.

The global demand for the wipes and nonwoven consumption will be forecast to increase constantly. Worldwide, sales of wipes will benefit from rising incomes and urbanization, also busier lifestyles will drive demand for these convenience products. In spite of appearances, the wet wipes, due to their resistance to degradation, are harmful for the environment. The wet wipes are accumulated in landfills or are flushed down in the toilet, ending in aquatic reservoirs and are often washed out on beaches. The wet wipes are technically disposable, but it doesn't mean they disintegrate. It turns out that the wet wipes pose a risk to organisms in the natural environment, for example, through ingestion or entanglement. Additionally, the presence of plastics in marine species for human consumption and the high intake of seafood (such as fish, bivalves, and crustaceans) cause concern about the potential effects of plastics on human health. Moreover, another area that deserves urgent attention is clogging up the sewage systems caused by flushed away wet wipes, which generates huge costs for countries. The problems described above are proof that there is a need to design innovative, eco-friendly, degradable materials that can be used as alternative to the wet wipes based on non-degradable synthetic polymers.

The scientific aim of the research will be design, obtain and characterization of innovative materials in the form of dry sponge-like matrices composed of biodegradable natural (cellulose, chitosan, collagen, gelatin) or synthetic (polylactide, polycaprolactone, poly (vinyl alcohol)) polymers with the addition of microparticles (microbeads) containing surfactant solution as a substitute for the wet wipes. They will be created to be effective and suitable for household and industrial applications, what is more for personal care products. Such materials are innovation in materials science and could be significant alternative to harmful, non-degradable wet wipes, which will contribute to environment protection.

The most important task in this project will be the assessment of prepared materials degradation, which will be studied under different conditions (at room conditions, in salty and fresh water, in the soil and under the influence of solar radiation) by examining the weight loss of samples, and structural analysis by attenuated total reflection infrared spectroscopy (ATR-FTIR), scanning electron microscopy (SEM). The physicochemical properties of obtained materials will be also determined by porosity and density measurements, swelling tests, mechanical tests, thermal stability.

In the literature, the absence of any reports regarding the preparation of the polymer sponge-like matrices, which also characterize microbeads containing embedded surfactant solution that is released only under pressure. To date, such degradable materials have not been obtained that could successfully replace the wet wipes.