Nowadays, environmental issues, such as recycling or effective energy storage, especially batteries, are essential in technological development, protection of the natural environment or everyday life. Batteries are used in mobile devices or electric vehicles. Unfortunately, the most common lithium-ion contains limited in availability elements such as cobalt or lithium. Due to even one thousand times higher abundance of sodium, global availability, and low cost, sodium-ion batteries are promising substitutes for widely used lithium-ion batteries.

My work will consider the preparation of the new materials for negative electrodes in sodium-ion systems, using as a precursor wasted 3D printer polymeric filaments. Some of the polymers used as filament materials can become precursors for thermal processing to produce carbonaceous material for negative electrodes for sodium-ion batteries. Some 3D models require the use of support structures during the printing process, which are typically removed after printing is complete. After removal, the useless parts of printed models are disposed of. As an alternative, recycling may be considered. It is one of the most important processes for many key environmental, economic, and social reasons. It reduces the pollution caused by waste and manufacturing processes, saves finite resources of petroleum, saves energy, reduces the environmental footprint of production and consumption and creates new employment opportunities. Simultaneously, the utilization of rejected plastic waste could reduce the reliance on virgin polymers as precursors for carbonaceous materials.

Second stage of my research will focus on the development of carbonaceous composite materials. Some additives to carbon can play a crucial role in the terms of stability and energy storage efficiency in negative electrodes. This work will build upon previous investigations into carbonaceous materials derived from waste 3D printer filaments, aiming to develop sustainable and efficient electrode materials for next-generation energy storage systems.

The implementation of these products in sodium-ion technology could be helpful during the process of commercialization of such energy storage systems.