Rotational molding is a technology of non-wastage forming of thin-walled products, mostly of thermoplastic polymers, consisting of sintering and subsequent melting of polymer powders or micropellets in a rotating mold. Due to the possibility of one-stage shaping of large-size products with complex shapes that can be used in mechanical recycling processes, this technology has made it one of the most dynamically developing methods of processing polymer materials in recent years.

Among the activities undertaken to reduce the environmental impact of plastics, the production of polymer composites with natural fillers in their structure became the topic gaining ground in lat years. A new trend in research on the development of materials from sustainable resources is the use of waste fillers, including the valorization of plant-derived post-production materials generated during food processing. The currently conducted experimental work results have shown that many low-molecular compounds, including essential oils and extracts in plants' waste parts, show high antioxidant activity. The introduction of selected waste plant fillers to thermoplastic polymers as modifiers may significantly reduce the unfavorable impact of environmental conditions, including aging processes during the exploitation of final products. This phenomenon allows the hitherto unused waste to be classified as high-value functional fillers with high potential.

The characteristic feature of the rotational molding technology, which is the long-term exposure of the molded materials to elevated temperature, may cause the negative effects of thermal degradation on the shaped materials' structure. While the conducted scientific work allowed to state the confirmed antioxidant and stabilizing effect of the impact of plant-derived fillers on selected polymers, the considerations so far have not addressed the issue of the influence of the molten state processing conditions of composites on the final effectiveness of their impact on the polymer matrix. **The aim of the proposed project is to investigate the degradation phenomena occurring during high-temperature processing of polymer composites containing functional plant fillers in their structure and correlate them with the potential limitations of the effectiveness of the stabilizing effect of low-molecular compounds contained in them.**

As part of the research work planned in the project, the impact of the forming processes and preliminary preparation of polymer composites containing fillers rich in compounds with a confirmed stabilizing effect of polyolefin polymers, including polyphenols, phenolic carboxylic acids, and flavonoids, against unfavorable degradation phenomena that may lead to limiting their effectiveness in slowing down the aging processes of composites, will be undertaken. The multi-criteria assessment of the impact of process conditions will consider the correlation of the structure and properties of the final products with the measurements of low-molecular organic compounds formed as a result of thermal decomposition during technological processes.

Referring to the described degradation phenomena during processing, influencing changes in the structure of composites and fillers with a complex chemical structure, changes in the effectiveness of the stabilizing effect of functional plant-derived fillers on the polymer matrix will be analyzed. Composites shaped in various process conditions will be subjected to accelerated aging processes, and the multifaceted analysis of the environmental impact will be related to the manufacturing procedure and material compositions. In effect, complete information is necessary to produce a new generation of low-cost and environmentally friendly materials processed in the rotational molding technology will be determined.