Functional fibrous materials, for instance electrically conductive or bioactive, draw increasing attention due to a wide range of potential applications. Conductive materials are a new textile class that combines the advantages of textiles, such as lightness, softness, porosity and large surface area, with electrical conductivity, which creates perspectives of numerous applications, for instance as electrodes in batteries, thermoelectric materials, antistatic materials. However, in some applications, especially biomedical, or in garment, also antibacterial activity is an important advantage.

The purpose of the project is to investigate the possibility of multifunctional modification of polyester nonwovens, made of biobased and biodegradable polymers - polylactides (PLA) and polyhydroxyalkanoates (PHA). The nonwovens will be produced by electrospinning of polymer solutions. This method allows to obtain fibers with different diameters and structure. Electrical conductivity will be imparted coating the fibers with graphene oxide (GO), using aqueous GO dispersion, and chemical reduction of GO to reduced graphene oxide (rGO). To reduce GO and, additionally, to impart antibacterial activity to the fibers, natural phenolic compounds, like quercetin and thymol will be used. Another method used will be impregnation using supercritical CO_2, in which antibacterial substance will be dissolved. The impregnation of the nonwovens with thymol or quercetin will allow to obtain antibacterial activity. The possibility to coat the thus-modified fibers with GO and to reduce GO to achieve electrical conductivity will be also explored. The nonwovens will be examined before and after the modification. Their structure, thermal, electrical and mechanical properties will be investigated as well as water wettability and antibacterial activity. Studies carried out in the project will allow to obtain new functional materials and will extend the state of knowledge on the modification of fibrous materials based on biodegradable and biobased polyesters.