M-ERA.NET Call 2021

Project Acronym: **3DNano-HPC**

Title: 3D Biotextile with Technological Composition of nano particles to enhance the protecting properties.

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Abstract.

The objective of the project was the development of innovative 3D biotextile materials based on the establishment of a technological platform devoted to technological composition of nano particles in fibre's structure to enhance the protective properties of the biotextile. It was based on the production strategy targeted to create and produce high performance composites by combining the fibers in 3-dimension positions, including high quality fibers encompassing polymer structure + succinite and its derivatives+SiO2+Ag and bio-testing of newly produced materials. It represents the complete chain of production, from technological development of new textiles to bio-testing applications, and, therefore, provides feedback within the system for optimization of processing requirements, an approach that has not been applied to the previous generation of biotextile materials.

Potential benefits are extension of boundaries to the protective properties of the 3D biotextiles:

protective properties provide enhanced protection against different frequency & density electromagnetic fields (EMFs), including the protection from household appliances 50 Hz low frequencies, a mobile phone, and specific frequencies in the Radiofrequency range (100 kHz to 300 GHz RF EMFs), including 5G technology's, as well protection from ultraviolet radiation (UV) (ƛ = 240-400 nm) and will create of the mechanical barrier from the negatively charged micro pollutant particles, including of biological origin (1-10 mkm).

The 3D composition has a high degree of air permeability, nanostructured particles occupy a large contact area and have a uniform distribution over the surface of the filaments. In addition to nanoparticles of succinite (250-500 nm) and its derivatives that are bioactive compounds, to enhance protective properties of newly developed biotextile material specifically processed nanoparticles of metals (Ag) and SiO2, were incorporated.

The Project help to transform existing scientific collaborations into long-lasting synergies and help to enhance the level of scientific excellence of participating scientists, both early-stage and experienced researchers, in areas of high performance composites, biotechnology (biocompatible, anti-microbial properties and biodegradable properties) and bioengineering implementing it through various multidisciplinary cooperation activities. Advanced biological technologies were used as the basis for studies of the phenomena of cell response and early detection of damaged cells.

This Project covers all activities necessary for conducting research (TRL4), and for creation of 3D biotextile material with a focus on innovation-related activities: piloting (TRL5), demonstration, testbeds (TRL6), and support for public procurements and market uptake. The functioning of the technological platform was based on the principles of fast, reliable, affordable, and cost-effective solutions.

New material is very important under contemporary conditions when most of the population live in urbanized areas steadily affected with electromagnetic fields, ultraviolet radiation of high intensity and pollutant particles.