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

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## Abstract

The objective of the project was 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 (to protect the population living in urbanized areas steadily affected with electromagnetic fields, ultraviolet radiation of high intensity and pollutant particles). It was based on the production strategy targeted to create and produce HPC by combining the fibers in 3-dimension positions, including fibers encompassing polymer structure + *succinite* (5-10 nm) +$SiO_2$ (3-10 nm) +Ag (20-50 nm) and bio-testing of newly produced materials.

Potential benefits are extension of boundaries to the protective properties of the 3D biotextiles against different frequency & density electromagnetic fields, including the protection from household appliances 50 Hz low frequencies and specific frequencies in the Radiofrequency range (100 kHz to 300 GHz), as well protection from ultraviolet radiation (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).

To investigate the protective properties of the biotextiles, were examined the effects of low-frequency electromagnetic radiation (50 Hz, 1.3 mT magnetic flux density) on the physiological and molecular levels of the test organisms (*Lemna minor* (laboratory line Sta2, 2n chromosomes, axenic culture).

Results showed a reduction in point mutations in *L. minor* Sta2 clones grown covered with biotextiles containing 0.25%, 0.5%, and 1% succinite nanoparticles compared to the control group (biotextile without succinite).

In conclusion, 3D biotextile versions incorporating succinite nanoparticles (0.25%) within the polymer fabric coating demonstrate significant potential as protective biotextiles, mitigating the effects of LF EMF and potentially other stressors.

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Further information:

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