PROJECT FACTSHEET

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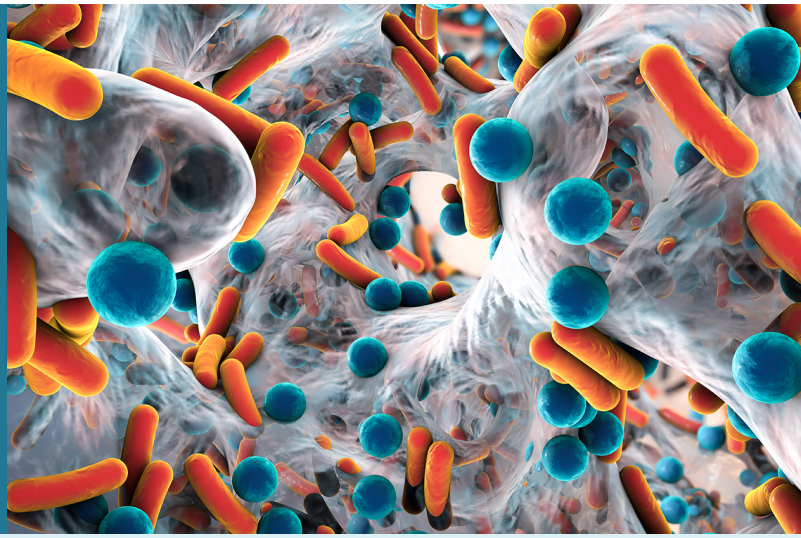
NBactspace

Towards novel non-toxic and antimicrobial coatings for spacecraft indoors



Inspiration

The surface treatments used on spacecraft indoors recently proved to have a long-term toxicity risk due to their composition based on heavy metal particles, such as silver and copper. In parallel, a growing number of pathogens strains is showing an antibiotic resistance. At the dawn of human Space missions, involving more and more people for an increasingly time, it is of high importance to guarantee the astronauts safety against microbial, algal and parasite proliferations, but also against nanoparticles toxicity.

Moreover, the rarity and constraints level of the Space conditions are leading to a limited state-of-art, quasi inexistent when it comes to biosourced or rare earth element alternatives to heavy metal-containing coatings.

Innovation

The ESA NBactspace project, funded by the European Space Agency (ESA), aims to develop easily up scalable heavy metal-free antimicrobial coatings with broad spectrum activity for spacecraft indoors. To do so, LIST will work on the whole surface treatment process, from the material composition and deposit conditions to the antimicrobial, cytotoxicity and ageing tests, with a view to reach the same efficiency as the current coatings.

With proven experience in surface treatment, LIST's materials department will test and evaluate five heavy metal-free antimicrobial solutions, for some already developed by LIST researchers. In this framework, LIST's environment department will bring its expertise in microbiology and cytotoxicity. Heavy metals will be replaced by biosourced materials (e.g. antimicrobial peptides), mesoporous silica, plasma polymers and nanopatterning producing no particles, or nontoxic biocompatible compounds.

LIST researchers will work on the nano and micro transformation of the materials, and thus generate novel combinations of materials and nano- & microstructures. In addition, they will develop an innovative combination of the main antimicrobial mechanisms known in order to optimize the coating protection against pathogens. The solutions will be either following vapor-phase deposition processes (CVD) or liquid-phase deposition processes, and will be tested on an A4 surface at the end of the project.

Impact

ESA NBactspace will enable the creation of the first nontoxic alternatives to current surface treatments used for spacecraft indoors. It will guarantee the spacecraft indoors safety, but also prepare the future human Space missions.

As a result, this research project will provide a new insight to the current state-of-art and will have a significant impact on confined environments standards' definition and improvement. This novel technology, developed under conditions relevant to Space, has potential for transferability within a wider context, e.g. biomedical devices, patches, wearable devices.

Financial Support

European Space Agency

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