

Next Generation BiOactiVe NAnocoatings - NOVA

Scientists and industry unite to develop the next generation of antimicrobial coating technologies to provide safer environments

The transmission of pathogenic microorganisms can happen rapidly with catastrophic and long-term consequences. The growing consequence of antibiotic resistance, and the constant reduction in efficacy of antibiotics is now a global concern. One potential solution to help control the spread of pathogens is a greater emphasis on surface hygiene in almost every facet of daily life. The **Next Generation BiOactiVe NAnocoatings (NOVA)** project aims to help make this solution a reality. As part of the European Union's Horizon Europe Framework, the project involves fourteen partners across nine countries from which scientists and industry are collaborating to bring to market highly efficient, environmentally friendly, and stable antimicrobial (antibacterial, antiviral, antifungal) coatings in order to reduce the risk of future microbial infections.

The antimicrobial coating solutions offered by NOVA have different properties and are based on four pillars or technologies pioneered by EVONIK, Fraunhofer IFAM, SPARTHA Medical, and Polymer Institute SAS. Antimicrobial coatings from SPARTHA Medical are contact killing based and are made up of a layer-by-layer blend of water-soluble biopolymers. The other three antimicrobial coatings, on the other hand, are triggered by visible or artificial light, and are based on different types of nanoparticles, with different function and antimicrobial activity. By exploring multiple coating technologies and their combinations collaboratively, the NOVA project will be able to give a holistic solution for specific situations such as hospitals or aeroplane cabins.

NOVA is coordinated by DECHEMA e.V. (Society for Chemical Engineering and Biotechnology), a non-profit scientific and technical society based in Frankfurt am Main, Germany. The project began on September 1st, 2022, and is scheduled to run for four years, with a total financing value of 7.496.128 € by the European Commission, the Swiss State Secretariat for Education, Research, and Innovation (SERI), and the UK Research and Innovation (UKRI).

NOVA will bring coating solutions to current unmet requirements

"The corona pandemic has shown hygiene is paramount for our health. But we cannot rely on extensive chemical cleaning all of the time. We need new highly effective technologies, that are safe by design." - commented industry expert and NOVA's work package leader Anthonie Stuiver, senior scientist at AkzoNobel.

NOVA has assembled an interdisciplinary research team to create at least four novel antimicrobial coatings for frequently touched surfaces to enable safer working and living. The project aims to develop these antimicrobial coating technologies for four

specific application areas: public spaces, medical rooms, textiles, and touch screens. The development of each of these areas will be driven by an industrial partner from the consortium: AkzoNobel, Siemens Healthineers, SPARTHA Medical and Evonik, respectively. Due to the broad scope of applications and the desire to benefit from the knowledge and experience from our industrial partners, NOVA's product development strategy begins by gathering our experts input and pain points as "use cases" and employing them as guidelines throughout the development of novel antimicrobial coating technologies. Moreover, product innovation experts from Dolmen Design and Innovation will ensure suitable application instruments for each final coating.

NOVA will establish a roadmap for antimicrobial coating development and testing

Industrial Microbiological Services LTD and Manchester Metropolitan University are specialists in the microbiology of materials and have extensive experience in testing and validating the performance of antimicrobial materials. They are a pivotal part of the NOVA team as it is important that antimicrobial surfaces and coatings are evaluated using a methodology that provides robust, reproducible data that reflects their intended effectiveness in use. As current methods do not meet this need, the NOVA team will not only ensure the functionality of the coatings developed, but also work on new antibacterial, antifungal, and antiviral testing methods for real-world and operational conditions.

NOVA will align technological advancements with the well-being of individuals and the planet

Safety is critical for the widespread use of antimicrobial coatings and is a cornerstone of our research. NOVA will guarantee that our antimicrobial coatings do not pose a threat to human health, well-being, or the environment during their use and during their life cycle. At the same time, NOVA seeks to provide a sustainable design that minimises negative environmental impacts and preserves resources. In order to provide thorough information on the safety of our coating materials, NOVA has assembled a team of academic experts who are working to customise existing toxicity testing methodologies to the particular requirements of coatings. The institutions that perform these activities are: The Fraunhofer Institute for Ceramic Technologies and Systems, Empa, University of Ljubljana, and Inserm. In addition, Empa is also leading a safety by design approach to coating development, which will allow potential environmental concerns to be investigated and incorporated into coating specifications to avoid any potential environmental risks.

NOVA will enhance the antimicrobial coating development process with in-silico models for risk management and coating development

NOVA will yield a large amount of research data from several scientific disciplines. Preste, an expert company for software engineering, algorithms, and data science will not only oversee the proper administration of this data and the implementation of the FAIR (Findable, Accessible, Interoperable, Reusable) principles inside the project, but will also use the generated data to construct in-silico models. These in-silico models have the potential to revolutionize coating development by enabling faster and more efficient formulation optimization, predictive modelling, and process optimization. By harnessing the power of data-driven insights, NOVA researchers expect to advance the field of coatings and create high-performance, sustainable solutions for various industries.

NOVA will contribute to improving citizens' health and enabling safer working and living. The NOVA team invites experts, and professionals, as well as citizens interested in learning more about our initiative, to visit <https://eu-nova.eu/> and follow us on social media: @NOVA-EU (LinkedIn) and @NOVA4Nano (Twitter). It is also possible to contact the team directly through the website or via LinkedIn.