

KU LEUVEN



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This project has received funding from the European Union's Horizon Europe research and innovation programme under Grant Agreement No 101058422.



06 - 08 MAY 2026
PRAGUE - CZECH REPUBLIC

RELIANCE – NANOBLOC – NOVA – MIRA – SUPREME



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Back to the Future



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Antimicrobial, Antiviral, and Antifungal Nanocoatings (RIA)

HORIZON-CL4-2021-RESILIENCE-01-20



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Expected Outcome:

The recent outbreak of the COVID19 virus has demonstrated that costs in both human life and economic terms can be immense if measures are not in place to contain a spread of infection. It is apparent therefore that passive measures are in place to minimise the impact of current and future infection outbreaks. Nanoparticle filled coatings such as metal nanoparticles, carbon nanotubes, metal oxide nanoparticles, heterostructures, patterned surfaces and graphene-based materials have demonstrated up to 99.9998% effectiveness against bacteria, mould and viruses.

Projects are expected to contribute to the following outcomes:

- Minimise the risk of spread of infections from harmful pathogens arising from everyday human activities;
- Create a healthier living and working environment and offer holistic solutions to people with health issues;
- Improve citizen health and enhance the EU's reputation as a public health best practice region;
- Enhance economic benefits through reduction of lost hours of work through illness;
- Boost research, development and innovation in the EU;
- Provide business opportunities especially for SMEs;
- Sustainable synthesis of nanocoatings (including bio-based materials) especially with effectiveness against a range of pathogens.

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Scope:

Inorganic nanomaterials have demonstrated enhanced anti-microbial and anti-viral activity. They are also stable at high temperatures, robust, and have a long shelf life, compared to organic anti-microbial coatings. Research areas should address new antiviral and antibacterial nanocoatings for a range of applications addressing use on both surfaces of so-called high-traffic objects (e.g. door and window handles in public places, public transport, hospitals, public buildings, schools, elderly homes etc.) and/or coatings for textiles (e.g. protective clothing in food processing plants, laboratory coats, face masks, etc.).

The research should address the following aspects:

- Sustainable synthesis of nanocoatings/nanocomposites (including bio-based materials) with effectiveness against a range of pathogens;
- Application methods (both on surfaces and textiles);
- Surface adhesion and durability via assessing performance against wear (e.g. abrasion, washing, etc.) and degradation in the application environments on a variety of surfaces (e.g. glass, metals and various alloys, copper and steel, marble and stone slabs, ceramics and tiles, textiles and plastics);
- Toxicity of nanocoatings.

Proposals submitted under this topic should include a business case and exploitation strategy, as outlined in the introduction to this Destination.

This topic is directly related to the well-being of citizens in the context of COVID-19 virus pandemic.

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SUSTAINABLE NANOPARTICLES ENABLED ANTIMICROBIAL SURFACE COATINGS

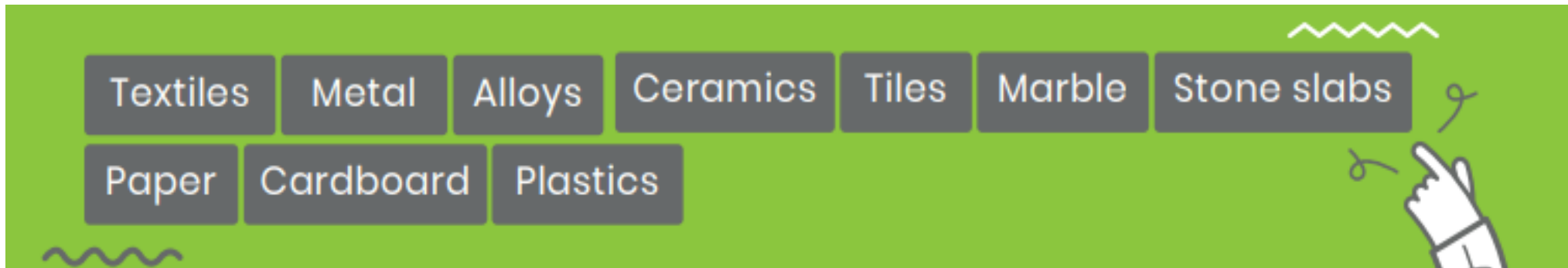
Textiles Metal Alloys
 Ceramics Tiles Marble Stone slabs
 Paper Cardboard Plastics



SUPREME Project



SUstainable nanoPaRticles Enabled antiMicrobial surfacE coatings



January 01, 2023 – December 31, 2026 – June 30, 2027



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SUPREME Project



PROJECT COORDINATORS



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SUPREME Project



Aims to develop innovative nanocoatings based on **customised core/shell** and advanced functional **nanoparticles** with superior **antimicrobial** effectiveness

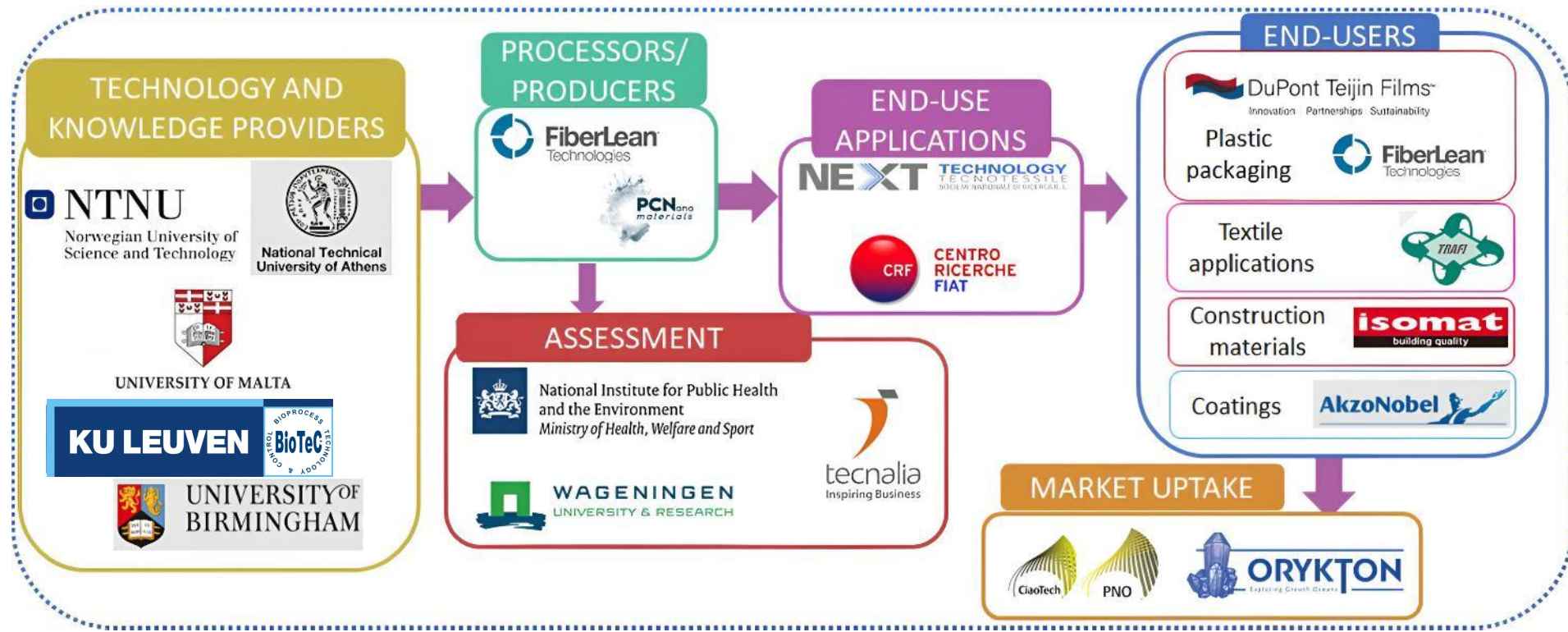


- **14 beneficiaries from EU**
- **1 associated country – NO**
- **4 associated partners from UK**

SUPREME Project



Aims to develop innovative nanocoatings based on **customised core/shell** and advanced functional **nanoparticles** with superior **antimicrobial** effectiveness

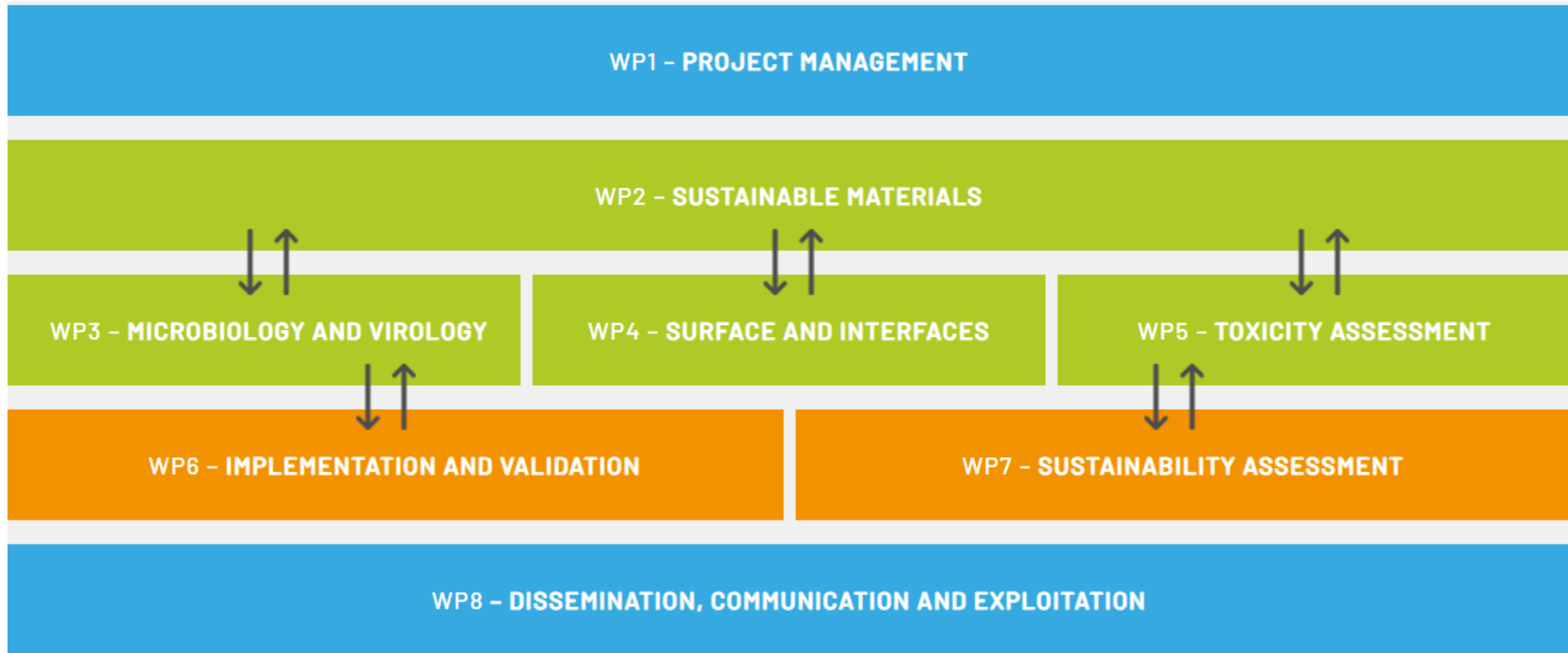


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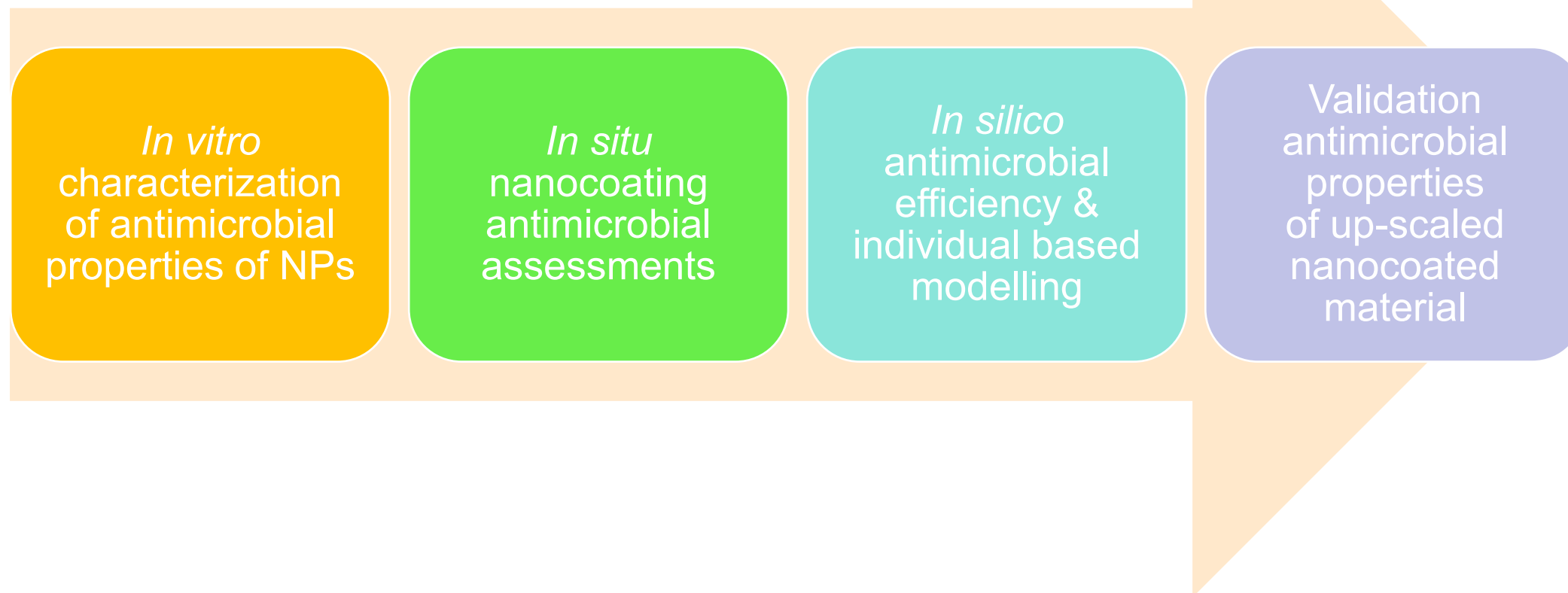


SUPREME Project



SUPREME Project Philosophy

Example: Microbiology & Virology



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CONSORTIUM



CONTACT US

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€ 4.737.523 budget



48 months



19 partners



8 countries



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[@supreme_eu_proj](https://twitter.com/supreme_eu_proj)



www.supreme-project.eu



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**SUstainable nanoPaRticles
Enabled antiMicrobial
surfaceE coatings**

Textiles

Metal

Alloys

Ceramics

Tiles

Marble

Stone slabs

Paper

Cardboard

Plastics

THE PROJECT

The catastrophic pandemic caused by SARS-CoV-2 in 2020 attracted the attention of the general public towards the spread of harmful pathogens facilitated by high traffic surfaces, highlighting the importance and urgency of an economically and environmentally sustainable solution for antimicrobial surface as a potential strategy to mitigate the spread of disease outbreaks.

Nanoparticle (NP) filled coatings, with recognised effectiveness against bacteria, viruses, and fungi, could be valuable candidates for developing antimicrobial surface and minimising the surface adhesion of pathogens. However, due to many technical challenges, including difficulty to develop nanocoatings with a long-term antimicrobial capability, durability under real conditions, and safety assurance, their application at industrial level remains limited.

The SUPREME consortium will develop a platform of efficient and multifunctional antimicrobial nanocoatings, building upon bespoke TiO₂ nanoparticles that have demonstrated an exceptional antimicrobial ability at lab scale (TRL3). Two sustainable routes: 1) customised core/shell and advanced functional nanoparticles and 2) sustainable bio-based cellulose materials and nanoparticles, will be pursued in this project. Bearing in mind the specific requirements of individual applications, the SUPREME consortium will coordinate the antimicrobial testings to its effectiveness against a wide range of pathogens. Production of the SUPREME coating will follow a sustainable-by-design approach that considers both toxicity and environmental impact from outset to guarantee both market acceptance and sustainability of the overall process whilst having a robust safety assurance in place for human health. The scaling-up production of these sustainable materials and their validation according to the industrial requirements will enable to reach the TRL6 by the end of the project.

OBJECTIVES

1. To co-create an innovative antimicrobial nanocoatings platform with end-users.
2. To demonstrate a superior and selective effectiveness against a broad spectrum of harmful pathogens, including representative bacteria, virus and fungi.
3. To ensure a satisfactory durability and excellent adhesion of the coatings.
4. To ensure a robust safety of the nanocoatings by implementing a Safe-by-Design approach.
5. To validate the SUPREME nanocoatings for target applications.
6. To ensure the environmental benefit of the nanocoatings using an eco-design approach and demonstrate the overall SUPREME sustainability.
7. To demonstrate and showcase the feasibility to produce in a relevant innovative antimicrobial, antiviral and antifungal nanocoatings to key stakeholders.

IMPACT

SUPREME's project results will offer a unique contribution towards the following impacts:

1. Minimise the risk of spread of infections from harmful pathogens arising from everyday human activities.
2. Create a healthier living and working environment and offer holistic solutions to people with health.
3. Improve citizen health and enhance the EU's reputation as a public health best practice region.
4. Enhance economic benefits through reduction of lost hours of work through illness.
5. Boost research, development and innovation in the EU.
6. Provide business opportunities especially for SMEs.
7. Sustainable synthesis of nanocoatings (including bio-based materials) especially with effectiveness against a range of pathogens.
8. Industrial leadership and increased autonomy in key strategic value chains with security of supply in raw materials, achieved through breakthrough technologies in areas of industrial alliances, dynamic industrial innovation ecosystems and advanced solutions for substitution, resource and energy efficiency, effective reuse and recycling and clean primary production of raw materials, including critical raw materials, and leadership in the circular economy.
9. New sustainable-by-design materials with enhanced functionalities and applications in a wide range of industrial processes and consumer products.
10. Leadership in producing materials that provide solutions for clean, toxic/pollutant free environment, decarbonising industry, and safeguarding civil infrastructures.
11. Leadership in circular economy that strengthens cross-sectorial cooperation along the value chain and enable SMEs to transform their activities and business models.
12. Increased adoption of key digital and enabling technologies in industrial value chains and strategic sectors, paying particular attention to SMEs and start-ups.



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SUPREME Project



KU Leuven Team



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Simen Akkermans

***In vitro, in situ and in silico* assessment of SUPREME materials**



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Cluster Technologie Odisee

Chemie

Cluster Gezondheidszorg Odisee

Voedings- en dieetkunde

Biomedische laboratoriumtechnologie

Industriële Ingenieurswetenschappen KU Leuven

Departement Chemische Ingenieurstechnieken





99.9998% *effectiveness against
bacteria, mould and viruses*



#supreme-coating



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(N)One Solution suits all...!



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Thank you



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