



Sustainable nanoPaRticles Enabled antiMicrobial surfaceE coatings

Textiles

Metal

Alloys

Ceramics

Tiles

Marble

Stone slabs

Paper

Cardboard

Plastics



BREAKING NEWS

In this issue, we're excited to share the latest updates, results, and highlights from our project. From technical breakthroughs and collaborative milestones to real-world validation and upcoming events, there's plenty of exciting news to report! For continuous updates, follow us on [LinkedIn](#) or check out our news [website](#) section.

THE SUPREME GENERAL MEETING IN PORTO



Group photo of the SUPREME Consortium

The SUPREME General Meeting in Porto, Portugal, hosted by PNO Portugal in November 2024, was a successful gathering where project partners reviewed progress, discussed future strategies, and aligned on upcoming milestones. The following photographs show some of the moments of the SUPREME General Meeting in Porto.

The SUPREME Consortium gathered in Porto, Portugal in November 2024 for the project's General Meeting, hosted by PNO Portugal. The event was a key moment to evaluate progress, align on the path ahead, and strengthen collaboration between partners across work packages.



Presentation and workshop during the SUPREME Consortium in Porto, Portugal



Conference room in the Meeting Venue at Grande Hotel do Porto



Social Visit to the Palácio da Bolsa and Ribeira in Porto

MAIN TOPIC: FROM LAB TO INDUSTRIAL APPLICATIONS



In this 4th edition, we're proud to spotlight how SUPREME is bridging the gap between laboratory research and industrial-scale applications. Our innovative antibacterial nanotechnology is advancing rapidly, with partners making key strides in transforming scientific breakthroughs into practical solutions tailored for real-world use. From early-stage formulation to pilot-scale validation, SUPREME is unlocking the potential of sustainable, high-performance coatings for diverse sectors. Join us as we explore how these developments are shaping the future of safer, more resilient materials in everyday life.

NTT & TRAFI

The topic "From Lab to Industrial Applications" is especially relevant in the context of the SUPREME project, where rich exchanges between partners have helped bridge the gap between research and market. Strengthening collaboration between research centers and industry is essential to transform high-potential scientific ideas into practical, scalable applications. While research institutions focus on discovery and innovation, industry brings the drive to turn these advances into improved products and competitive solutions. Initiatives like SUPREME, built on strong public-private cooperation, play a key role in this transition. In SUPREME's case, academic and industrial partners are working together to develop and apply antimicrobial, antiviral, and antifungal nanoparticles for sectors such as textiles, automotive, and construction, laying the foundation for commercial products with real-world impact, including in healthcare.

One example is the collaboration between two Italian partners involved in the SUPREME project: NTT and TRAFI. NTT is an academic partner, while TRAFI is a company specialized in the dyeing of yarns, fabrics, and clothing, and together they collaborate to validate a method for applying nanoparticles on textile substrates. Specifically, NTT received the nanoparticles developed by other academic partners developing a formulation in which the nanoparticles are dispersed. The study of the formulation depends not only on the nature of the nanoparticles but also on the application process used by TRAFI. In fact, NTT has collaborated with TRAFI to gather the market requirements necessary to apply nanoparticles on several fabrics types.

These requirements cover various technical aspects: the viscosity of the formulation, the type of dispersing medium, the concentration of nanoparticles, pH, and dispersion stability. The formulations were therefore adapted according to the needs of TRAFI's dyeing company, and the study was completed when the liquid formulations demonstrated a stability for about 72 hours.

Thanks to the versatility of TRAFI, application trials were already carried out on a semi-industrial scale. The liquid formulation was applied using traditional dyeing techniques: exhaustion dyeing and disperse dyes dyeing. The success of the application was verified through validation tests: i) SEM for observing the distribution of nanoparticles on the fabric; ii) Tests of nanoparticle solidity on the fabric (washing, abrasion tests, etc.) to assess the nanoparticle-substrate adhesion; iii) Microbiological and viral tests to verify the antimicrobial, antiviral, and antifungal properties of the final fabric. Both cellulose and synthetic fabrics were treated. At the moment first validation tests performed by NTT are ongoing. The collaborative process, from lab-scale formulation to textile treatment, is illustrated Figure 5, showcasing the preparation of nanoparticle dispersions, the delivery of the liquid formulations, and the treated cotton and polyester fabric samples.



a) Preparation of the nanoparticles formulation at NTT's lab. b) Fabio Giusti from TRAFI met NTT for the delivery of the liquid products; c) Textiles treated with the nanoparticles formulation developed in the project: 1. and 3. cotton fabrics, 2. and 4. polyester fabrics.

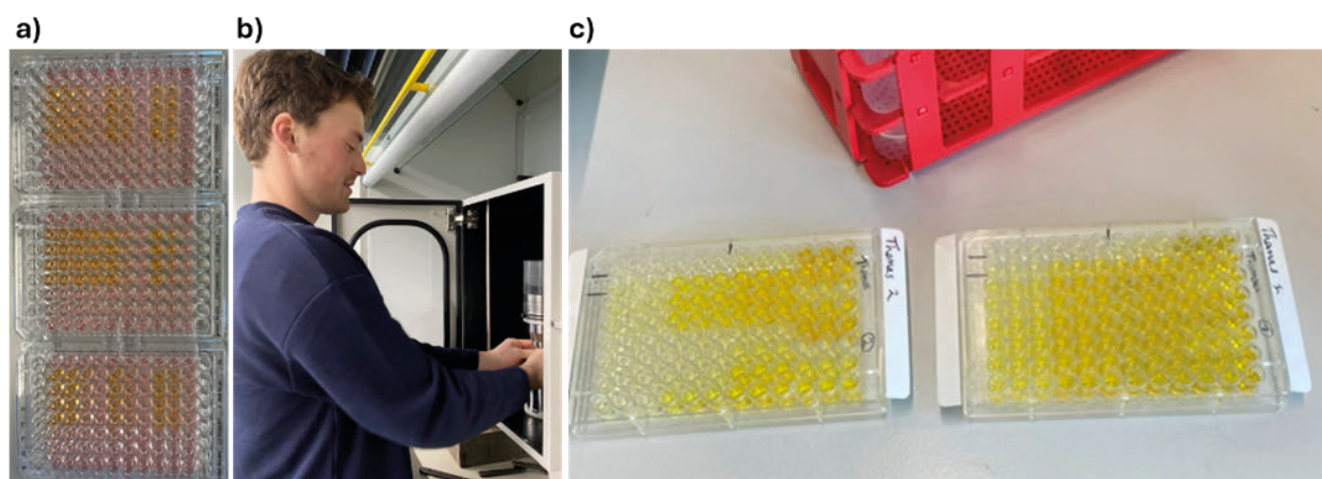
WU & RIVM

Work Package 5 (WP5) is focussed on assessing whether the candidate SUPREME nanomaterials have any potentially harmful effects on human cells. By providing rankings based on observed effects, we can help the consortium make informed decisions about which material to select for further application. WP5 is a collaboration between two partners in the Netherlands: Wageningen University (WU) and the Rijksinstituut voor Volksgezondheid en Milieu (RIVM).

At WU, we previously looked at how intestinal cells and immune cells respond to the materials. Using WST-1 assays and ELISAs, we assessed changes in metabolic activity and immune signalling. Currently, Tanne and MSc student Corine are continuing this work with lung cells. As part of her thesis, Corine has tested the newest materials across a broad concentration range and will soon begin analysing potential immune effects. In parallel, Tanne is conducting broader screening in immune cells as well as lung cells to continue to support the comparative ranking of the materials. The WST-1 assay plates used to assess cellular metabolic activity after nanomaterial exposure are shown in Figure 6 a), where color intensity reflects the level of cell viability.

At RIVM, MSc student Thomas is focussing on material characterisation to be able to determine how much of the administered dose actually settles on the cells. His thesis involves measuring hydrodynamic particle diameters and agglomerate density in the media used for cell culture after 4 and 24 hour incubations. In addition, Thomas is investigating nanomaterial-induced reactive oxygen species (ROS) by measuring lipid peroxidation through immunofluorescence. Figure 6 b) and c) illustrate Thomas assembling the Cuphorn onto the Sonifier for optimal nanoparticle dispersion, as well as LPO assay plates where varying color intensities indicate different levels of oxidative stress induced by the tested materials.

Looking ahead, WP5 is preparing for a new phase involving Air-Liquid Interface exposures, which will allow us to study lung cell responses under more physiologically relevant conditions.



a) WST-1 assay plates to assess metabolic activity of the cells after nanomaterial exposure; b) Thomas assembling the Cuphorn onto the Sonifier for material dispersion c) LPO plates with multiple materials in three different concentrations. The colour intensity is proportional to the reactivity of the sample added.

INTERVIEW CORNER



Foteini Gerodimou
NKUA

Role @ SUPREME

"My role in SUPREME is to evaluate the antifungal properties of the SUPREME materials. All the materials synthesized through the SUPREME partners, were and will be tested under in vitro and in situ conditions, to ensure the performance of the antifungal activity before their final application."

Two words that come to your mind when you think about bacteria

"Contamination and resistance"

How your work @ SUPREME will change people's life in the future

"SUPREME aims to develop a new generation of innovative textiles with antimicrobial and antiviral properties that are also non-toxic to humans and mammals. My work contributes to the development of reliable and effective products that will enhance hygiene in everyday applications."

Three products of every-day life where SUPREME technology will be implemented in ten years

"In everyday life, SUPREME technology will be applied to fabrics, giving them antibacterial, antifungal and antivirus properties. This will help protect the doctors and all the hospital personnel and humans in general. Secondly, it can be applied in wall paints for homes, hospitals and public spaces. And of course, can be applied in air and water filters to reduce bacterial and fungal growth, improving the quality of life."

INTERVIEW CORNER



Nuria Espallargas
NTNU

Role @ SUPREME

"Research partner at WP4."

Two words that come to your mind when you think about viruses

"Surface adsorption, transmission"

How your work @ SUPREME will change people's life in the future

"We have recently started testing the new materials developed in our project, so the results are not yet conclusive. However, my goal is to contribute to the development of durable surface protection solutions that prevent the transmission of bacteria, viruses, and fungi among humans. This way, we can be better prepared for future pandemics."

Three products of every-day life where SUPREME technology will be implemented in ten years

"Fabrics/textile, hospital/health equipment, portable sprays for on-site surface sanitation."

WHAT'S HAPPENING?

What? 	Who? 	Where? 	When? 
<u>Athens Conference on Advances in Chemistry</u>	NKUA	Athens, Greece	06– 08.11.2024
<u>STOP Antimicrobial coatings conference</u>	KULeuve	Mons, Belgium	05 – 06.12.2024
<u>SCI Formulation Forum</u>	UoB	London, UK	21 – 22.01.2025
<u>Beyond 2025</u>	PCN	Athens, Greece	04 – 06.04.2025



Athens Conference on Advances in Chemistry (ACAC 2024): Poster presentation by Foteini Gerodimou on the SUPREME project: "Antifungal Efficacy of $\text{SiO}_2\text{@Ag/CeO}_2$ core-shell nanoparticles against *Aspergillus niger*" – Athens, Greece

STOP Antimicrobial Coatings Conference – Büşra Erol presenting the SUPREME project on behalf of the BioTeC+ group, KU Leuven – Mons, Belgium



Aspa Stoumpidi from PCN Materials at Beyond Expo 2025, a Digital Technology & Innovation International Exhibition and Conference held at the Metropolitan Expo in Athens, Greece, from April 4 to 6, 2025.



Looking forward to SUPREME Newsletter # 5 in December 2025!

CONSORTIUM



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