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VOL. 2

RELIANCE

25 Sept 2023

Newsletter

Smart response self-disinfected bio-based nanocoated surfaces for healthier environments

RELIANCE project aims to design and develop smart response self-disinfectant antimicrobial nanocoatings based on a new range of smart antimicrobial nanoparticles. They will consist of mesoporous silica nanoparticles with metallic copper in their structure (Cu-SMIN), modified with biobased bioactive compounds: Antimicrobial peptides (AMP's) based on protein containing waste streams, and essential oils (EOs) coming from non-edible plants. The antibacterial action of these additives will be adjusted to the specific application, according to the dosages and durability requirements.

ONE YEAR OF RELIANCE PROJECT

More than a year rolled by since RELIANCE project's kickoff last June and we are very happy to see the significant progress we've made towards achieving our goal – to create healthier environments in Europe through the design and development of innovative smart response self-disinfecting antimicrobial nanocoatings, with maximized sustainability and microbial repellency.

"In the first year of the project, we have built the foundations for new developments by taking advantage of the extraordinary competencies within the consortium. The first versions of sustainable nanoparticles and antimicrobial coatings are underway, and their scale-up will become fully operational in a few months. We are responding to a growing demand for antimicrobial nanocoatings and are confident that RELIANCE will contribute to a safer and more sustainable Europe with the work done in RELIANCE."

Miren Blanco, RELIANCE Coordinator, TEKNIKER

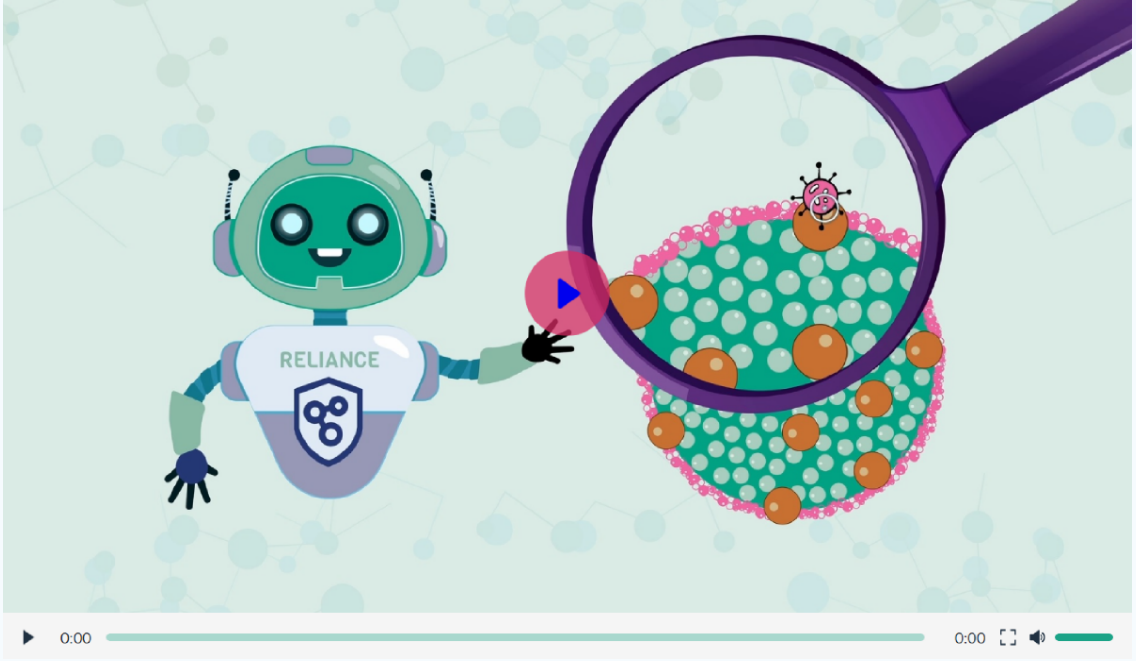
WHAT WE HAVE BEEN UP TO

RELIANCE First video released

It was with great excitement that the project released its first official video in the beginning of the year. The purpose of the video was to present general information about the project’s objectives, methods of work, expected results and societal impact to the general public. Therefore, we counted on developing a high-quality animation to explain the rather complex subject of antimicrobial nanocoatings RELIANCE works on, in an understandable and friendly way.

Quite an interesting detail is the introduction of the project’s mascot - the RELIANCE robot. Robots are smart, trustworthy and lack human inconsistency, hence, we consider them always reliable and capable of accomplishing comprehensive tasks. In the same way as RLEIANCE products can be trusted.

Enjoy watching the video below by clicking on the picture:

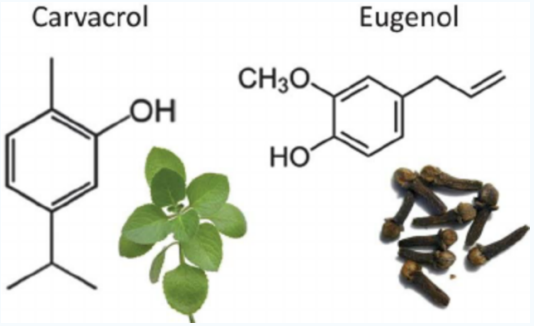


Antimicrobial Characterization and Nanotoxicity Study

The antimicrobial characterization of bioactive compounds, mesoporous additives, and obtained nanocoatings, selected and developed within RELIANCE Project, is the overriding goal of work package 7 (WP7) led by University of Rome “Tor Vergata” (UNITOV), in collaboration with Defense Institute for BioMedical Research (ISBD).

These materials are being tested on selected strains of bacteria, fungi, and viruses, to include SARS-CoV-2. Furthermore, a nanotoxicological study of the developed nanocoatings are addressed, to include environment and in-vivo test (inhalation). The testing activities are necessary to ensure the effectiveness of

the bioactive compounds, mesoporous additives, and obtained nanocoatings as well as their safety.

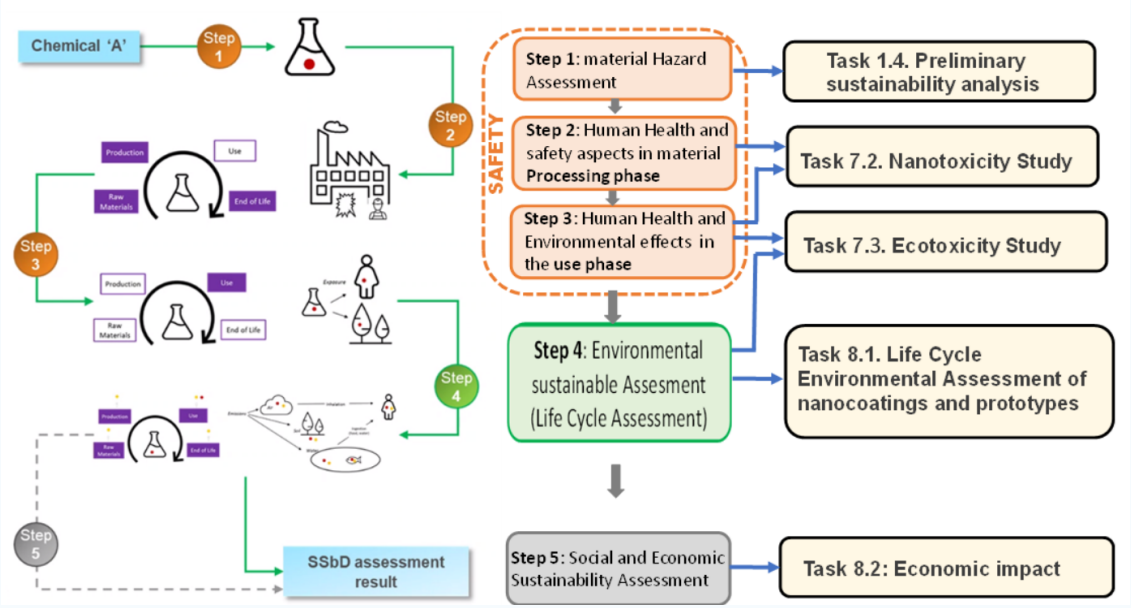


Designing the set-up for virus and bacteria analyses had started, using the reference methods while also adding testing of some essential oils such as Carvacrol and Eugenol.

Continue reading…

Preliminary Sustainability Analysis Report

From the very early stages of design and manufacturing, efforts are required to ensure that the antimicrobial nanocoatings developed within the RELIANCE project are sustainable for humans and the environment while enhancing recycling opportunities and the use of resources in a more efficient way.



Fundamental to the whole undertaking is the topical concept of 'Safe-and-Sustainable-by-Design' (SSbD), which implies the design of safe chemicals and materials, minimising their emission into the environment and the use of natural resources, with the aim to reduce the negative impacts to human health and the ecosystem. It integrates circularity, climate neutrality, functionality and safety of materials, products and processes throughout the life cycle.

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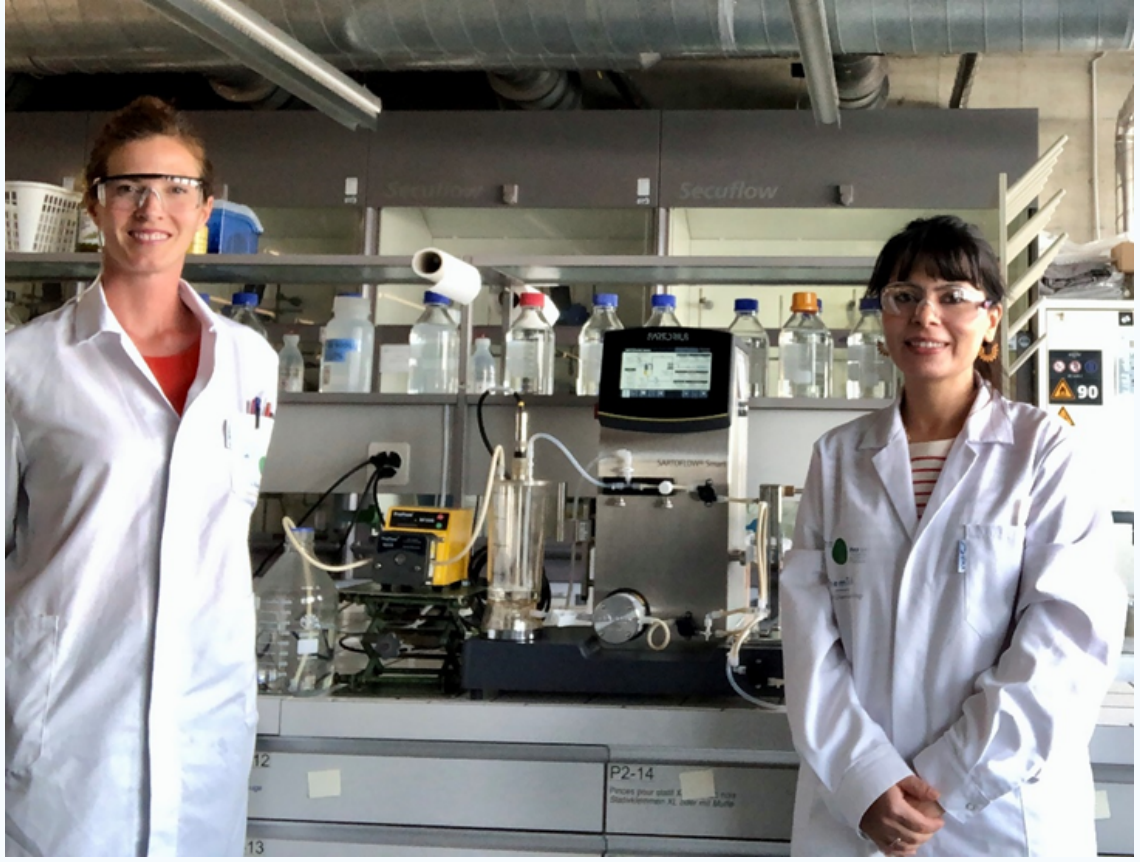
Progress on the synthesis of mesoporous nanoparticles

The mesoporous inorganic nanoparticles developed by RELIANCE act as nanocontainers of bioactives, due to their high stability, biocompatibility, large specific surface area, tunable pore diameter and easy surface functionalization, among other properties. They can be obtained by sol-gel technology which offers the possibility to scale up the synthesis process due to its cost effectiveness since it does not require expensive equipment and can be applied at low processing temperatures.

During the first year of the project, in addition to having optimized the synthesis procedures for obtaining smart-release nanoparticles made of silica, at lab scale, we are working on the incorporation of copper and its functionalization. We are excited with these promising first results which will help our continuing fight with infections caused by bacteria, virus and fungi in the future.

Read the whole article and see an electronic microscope image of the nanoparticles synthesized so far.

The Journey from chicken feathers to antimicrobial surfaces



In the lab working on keratin hydrolysis. ©HEIA-FR

Our Swiss partner Haute école d'ingénierie et d'architecture Fribourg (HEIA-FR) is responsible for identifying and isolating Antimicrobial Peptides (AMP) from chicken feathers. Millions of tons of feathers are generated annually as byproducts from the poultry industry causing serious environmental issues and impacting human health safety. Even though feathers are of interest due to their composition of 90% wt. of Keratin protein, they are still underexploited because of their high stability and resistance to common proteolysis protocols.

Read more about keratin hydrolysis here and take a look at initial progress.

MANAGEMENT MEETINGS

Coordination and progress checks on work activities are key for the success of such a versatile research and innovation project like RELIANCE. Partners enjoyed the opportunity to meet in person twice since the beginning of the year.

The second consortium meeting hosted by the Bluefactory, Fribourg, Switzerland was very productive, with interesting presentations on the advancement with the synthesis of mesoporous nanoparticles and microbe repelling coating formulations.

The day ended with delicious social dinner immersing partners in the local culinary tastes at Cafe du Midi – one of the two restaurants in Fribourg known for serving the best fondue.

The second day was dedicated to linking science to society, environment and business as essential for scientific results' vitality as well as market acceptance and implementation of scientific outputs.

The highlight of the day was the tour of HES-SO Haute école spécialisée de Suisse occidentale's facilities.

Check out the full story.

The 12 months since the start of the project were marked by the management meeting hosted by MILLIDYNE in Finland. The event took place in a charming wooden cabin with large windows offering breathtaking views of a lake and the surrounding forest. Results were shared, achieved milestones were celebrated and further strategies discussed.

Upon presentations' conclusion, we all enjoyed some relaxing time and traditional Finnish delicacies.

RELIANCE HE Project
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RELIANCE HE Project's fourth consortium meeting, marking 12 months since the start of the action, took place in #Finland amid lush green landscapes and crystal-clear lakes.

Read the whole story and view more photos 👉 https://lnkd.in/d3S3i5Kq

#partners #antimicrobials #polymerscience #nanoparticles #advancedmaterials #horizoneurope

A productive one year of RELIANCE project - Reliance HE

reliance-he.eu • 1 min read

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RELIANCE VISIBILITY

The novel methods and analytical approaches applied in RELIANCE for the development of a new range of antimicrobial nanocoating were presented at numerous events by partners.

Prof. Fabiana Arduini, Università Di Roma “Tor Vergata”, who leads the antimicrobial characterization work activities, shared on her research activity in the **electrochemical paper-based devices** used in the project at Women in Science, Engineering and Research Conference, Saudi Arabia this February. The annual event features talk by renowned scientists and engineers about their personal journeys and life-changing approaches.

The electrochemical paper-based devices were also presented at the “Materials for Biosensing & Bioimaging 2023” workshop held in Madrid and organized through the Institute for Advanced Research in Chemical Sciences – Universidad Autónoma de Madrid (IADCHEM).

The principle is applied in RELIANCE for evaluating the antimicrobial efficiency of the developed nanocoatings by using paper-based devices combined with a smarphone-assisted potentiostat. The method presents a high interest due to the findings that paper-based sensors can overcome the limitation of the classical miniaturized electrochemical sensors.

RELIANCE Project at LOPEC 2023

The paper-based electrochemical (bio)sensors were discussed at LOPEC 2023 Conference, Munich, in the session dedicated on “Challenges and use cases of large area, printed or organic electronics in biomedical applications which included all applications in biomedical and healthcare such as sensors, diagnostic devices and wearable health patches that contain significant printed and flexible elements”.

Read the full story

RELIANCE Presented at EMPACK 2023, Zurich

Our partners, Prof. Dr. Rudy Koopmans, Director of the Plastics Innovation Competence Center, HEIA-FR, Roger Marti, Professor of Organic Chemistry & Process Chemistry, HEIA-FR, and team attended EMPACK exhibition and as part of their participation, presented RELIANCE and its goals, objectives, work activities and expected results to visitors and exhibitors.

RELIANCE Poster presentation at 16 Freiburger Symposium 2023, Fribourg, Switzerland

The researchers from Fribourg School of Engineering and Architecture (HEIA-FR) took part in the 16. Freiburger Symposium organized by the Swiss Chemical Society in April where they presented the made progress within Work Package 2 “Synthesis of mesoporous nanoparticles with improved antimicrobial effect” with a poster entitled “Bio-based antimicrobial peptides for smart response self-disinfected surfaces”.

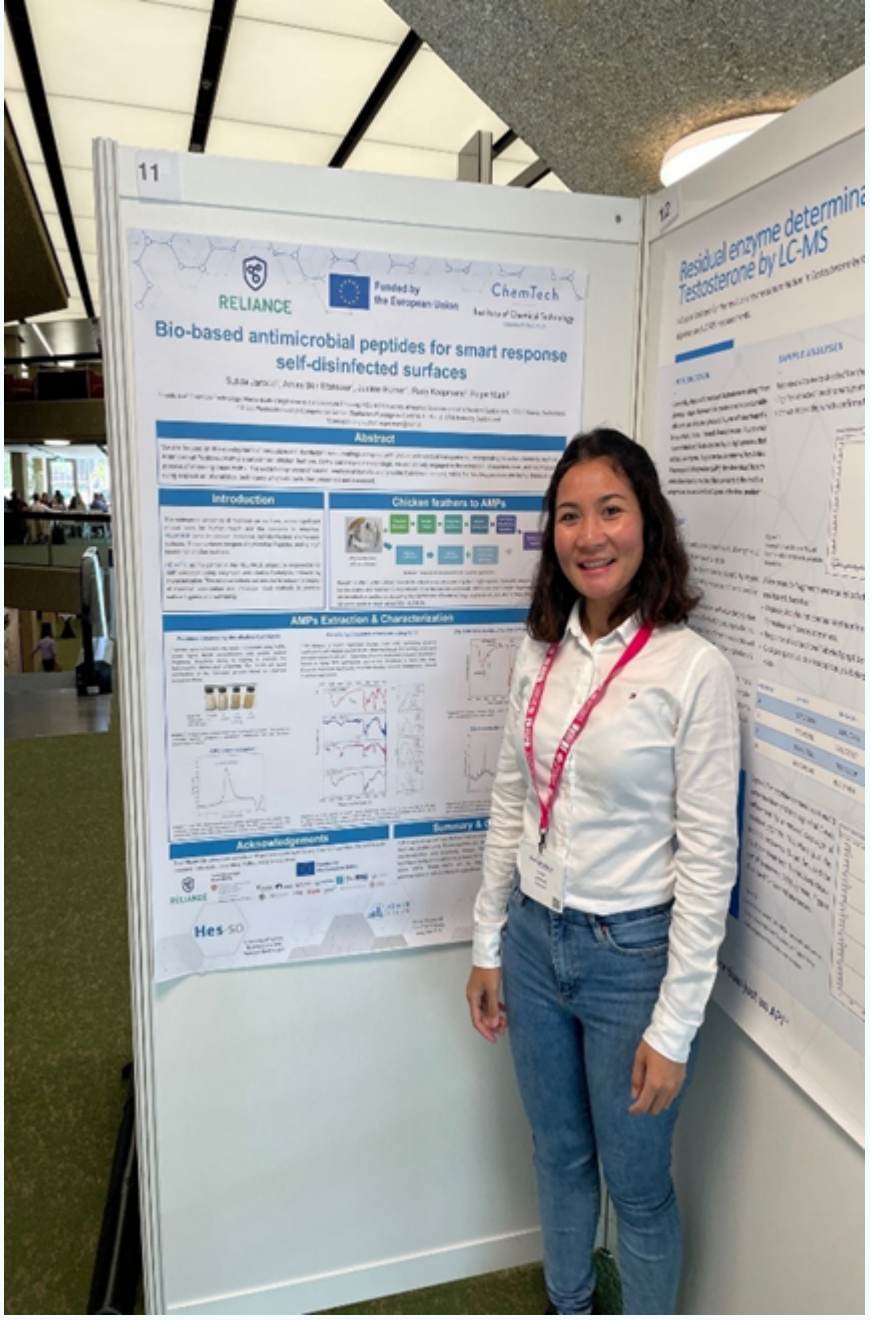
HEIA-FR team leads the activities related to optimizing keratin extraction from poultry feathers, which also involve a study of enzymatic methods for pure peptide fractions isolations, their characterization, and proper modification for achieving optimum boactive properties when attached to the copper doped mesopourous silica nanoparticles (Cu-SMIN).

Read more

RELIANCE Poster presentation at Euroanalysis 2023 Conference

21st edition the Euroanalysis biannual international conference of the Division of Analytical Chemistry of the European Chemical Society took place in Geneva, Switzerland, 27 – 31 August, 2023.

A yet another event of the scientific community where the project was presented by the Fribourg School of Engineering and Architecture (HEIA-FR) team with a poster.



Our colleagues shared some preliminary results regarding the extraction of antimicrobial peptides (AMPs) from keratin from chicken feathers through the application of various hydrolysis methods. These peptides undergo detailed

characterization of their bioactive properties in order to be incorporated in the unique nanoparticles RELIANCE develops.
The process will be further optimized for broader production and acquisition of fully active AMPs, to be integrated into materials, thus driving advancement in self-disinfecting applications.

Continue reading

CENTEXBEL and RELIANCE in Zwijnaarde, Belgium

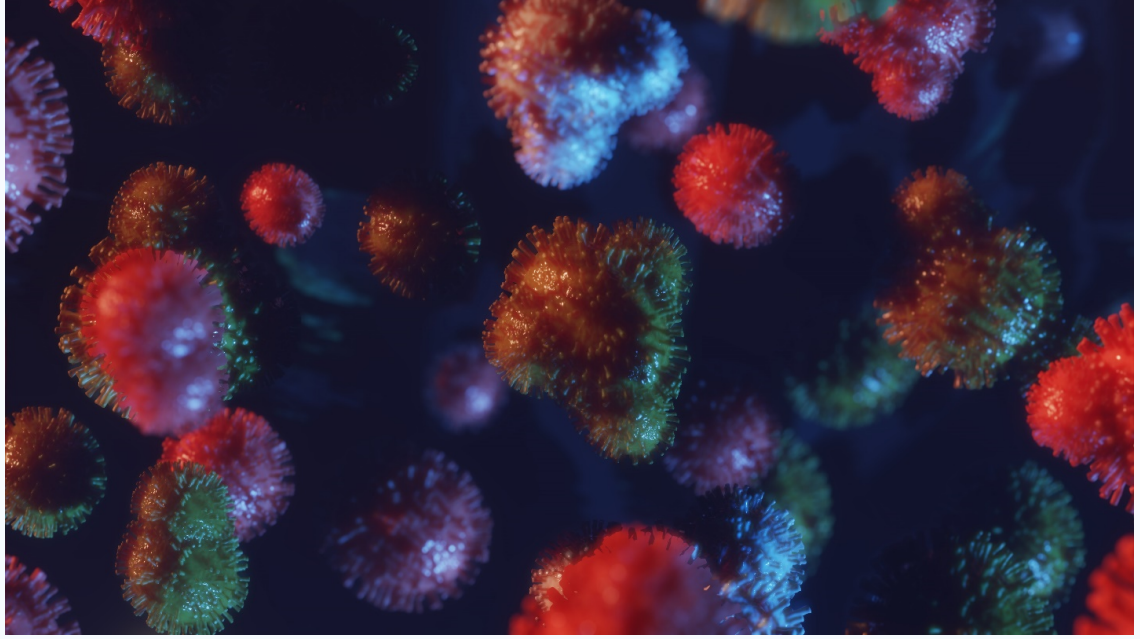
In June, RELIANCE partner Centexbel, leader of the work activities on the synthesis and formulation of biobased polyurethane nanocoatings and their application through digital printing, presented the project at the INFOhappening Textile Coating, Finishing, Dyeing & Printing workshop. The annual event was attended by 40 industry representatives of the coatings industry, some of who joined online.

The main objective of the workshop was to showcase to the participants innovative approaches in the textiles coating industry, new projects and associated novel technologies, interesting results and regulatory matters.

FROM OUR BLOG

An environmentally friendly alternative to fluorocarbons for inhibiting protrusion of coatings in fabrics

By Brecht Demedts (Centexbel), Yasmine Van Thuyne (Alsico High Tech)



Fabrics are fibrous substrates with a very larger surface area, with as a result that they absorb liquids very well. The large absorption of fluids can be both by capillary effects as through molecular swelling (e.g. water uptake by interacting through hydrogen bonds with cellulose). While this is a big advantage for comfort, it is an unwanted feature when adding coatings to textiles, because the coating pastes soak into the fabric rendering uncomfortable feel and touch.

Read the full article

COMMUNICATION AND DISSEMINATION

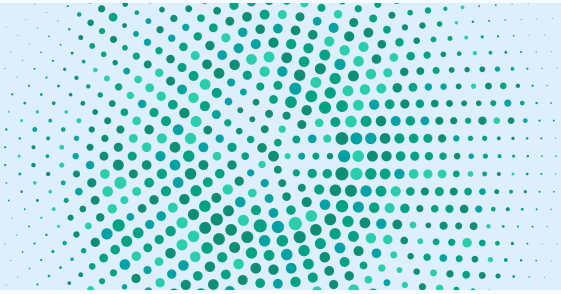
As an EU-funded Horizon Europe action, RELIANCE Project follows the ‘as open as possible, as closed as necessary’ principle in its communication approach. Therefore, the project grants immediate open access to peer-reviewed scientific publications and other project outputs eligible for public dissemination. We do this while ensuring the intellectual property rights of partners - owners of results -are appropriately maintained and protected.

The result of our work is mostly visible through project’s deliverables, 10 of which have already been submitted to the European Commission for approval. If you are interested in following the smart-response self-disinfecting antimicrobial nanocoating developments, visit the "Results" section on our website. All public deliverables are easily accessed there and could also be downloaded.

If interested in reading a sensitive deliverable, send us an email justifying your interest.

NETWORKING AS KEY TO KNOWLEDGE EXCHANGE

Networking with relevant projects, platforms, networks, associations and other initiatives generally supports the achievement of project objectives and maximizes the added value for achieving a continuing and long-term impact of project's results.

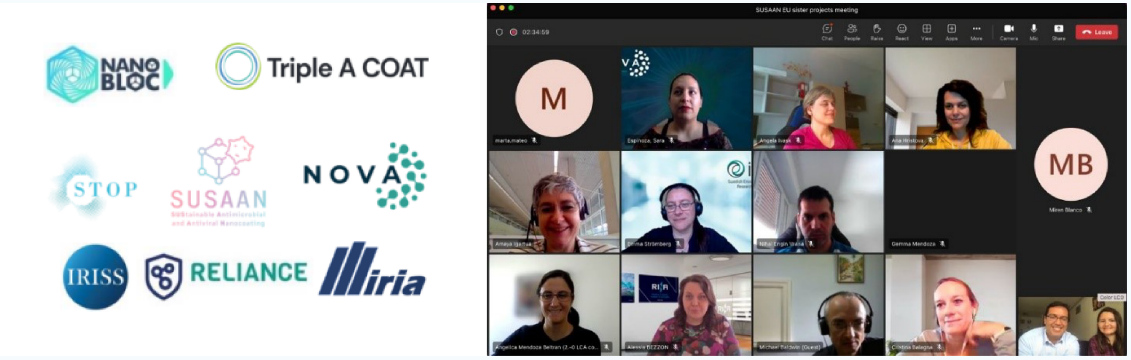


Fruitful synergies stem from setting up and maintaining relationships with similar ongoing projects that are developing resources under a collaborative dimension. Additionally, building upon the existing outcomes of past or close to completion projects seems to be contributing to a sustainable use of resources under a synergistic process by leaning on previous experience regarding results' testing and exploitation.

Both synergies and networking aid an enhanced dissemination of the project's outcomes to a broader audience and foster learning from, and building upon other projects' findings and experiences.

Exploring synergy opportunities - first meeting with seven similar projects

In the month of May, eight EU sister projects related to active nanomaterials innovations joined a virtual workshop on the invitation of sister SUSAAN project. The objective of this event was to open space for efficient communication and exploitation synergies as well as collaborative work to foster safe and sustainable nanomaterials development.



Besides RELIANCE and SUSAAN, the other participating projects were MIRIA, NANOBLOC, NOVA, STOP, TRIPLE-A-COAT and IRISS.

Coordinators and work package leaders touched base on potential cooperation on dissemination and communication activities, technical synergies and collaboration in the overcoming of potential sustainability challenges on the way

to the development of novel antimicrobial, antiviral and antifungal nanocoatings for frequently touched surfaces.

HELP US SPREAD THE WORD ABOUT THE LATEST GOINGS ON IN THE WORLD OF ADVANCED MATERIALS AND FORWARD RELIANCE NEWSLETTER TO FRIENDS, COLLEAGUES AND PARTNERS.

Get the next issue straight into your Inbox by subscribing here.

RELIANCE project is social. Visit our website or stay in touch by following us on LinkedIn and Twitter.

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