RELIANCE

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

COORDINATOR: **Fundación Tekniker** (TEKNIKER)

Microbial colonisation of surfaces forms a dangerous reservoir for pathogens contributing to spread of infections which can cause significant cost to human life and the economy at large. There is a tangible need for innovative antimicrobial coatings that are highly effective, safe, self-disinfecting, and more cost effective in killing bacteria, fungi, and viruses than the current non-biodegradable, toxic, and fossil fuel-based coatings.

These new coatings will contribute to mitigating the spread of infections (including COVID-19) and creating a healthier and more resilient society while ensuring consistent product efficiency and market demanded sustainability.

OBJECTIVES

RELIANCE project aims to design and develop smart response self-disinfectant antimicrobial nanocoatings based on a new range of smart antimicrobial mesoporous silica nanoparticles with metallic copper in their structure (Cu-SMIN), modified with biobased bioactive compounds: Antimicrobial peptides (AMPs) based on protein containing waste streams, and essential oils (EOs) extracted from non-edible plants. This will be achieved through the following objectives:

- Development of a new class of Cu-SMIN based biocidal additives with a synergistic mode of action and low impact on the environment
- Green synthesis of sustainable binder formulations for nanocoatings - organic and inorganic
- Optimization of cold-atmospheric plasma, spraying and digital printing deposition techniques, and nanostructuring of 3 types of antimicrobial nanocoatings, applied on chromed plated plastics, glass and stainless steel, and textiles
- Validate the new nanocoatings as high performing and with enhanced durability through demonstrators
- Ensuring that the proposed nanocoatings are non-toxic and sustainable, and confirm their economic value
- Promote the novel technologies for uptake by the industry

EXPECTED RESULTS

At least 2 additives as novel smart-response nanoparticles, easily incorporated in nanocoatings to achieve antimicrobial surfaces.

At least 2 new sustainable nanocoating formulations easily applicable to various substrates to allow for a long-lasting antimicrobial effect of nanoparticles.

3 types of nanocoatings with antimicrobial effect against a wide range of pathogens, sustainable enough to inhibit colonization, without toxic active agents' migration into the environment, easy to clean and durable.

Novel depositions to achieve nano-structuring that repels microbe adhesion.

Recycling possibilities for the antimicrobial organic coatings so that the treated surfaces can easily be taken up in a circular economy.

Publication of scientific papers featuring new strategies for designing and developing antimicrobial nanocoatings.

OUR PARTNERS

Tekniker – Member of Basque Research & Technology Alliance; MAIER; MILLIDYNE Surface Technology; POLYRISE; CENTEXBEL; République Française – INERIS maîtriser le risque pour un développement durable; TOR VERGATA Università degli Studi di Roma; EUROPROJECT A Warrant Hub Company; mpg molecular plasma group; Arçelik; alsico hightech; Haute école d'ingénierie et d'architecture Fribourg – Hochschule für Technik und Architektur Freiburg; University of Patras

KEY INFORMATION

PROGRAMME: Horizon Europe (Resilience)

CONSORTIUM: 15 partners from 8 EU and 2 non-EU countries

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