



# Asina Value Chain 1 – an overview on the case studies

**October, 18 2023 h 15:00 – 16:30**

## Free webinar

The webinar will start with a quick overview on the regulatory status of materials when used with antibacterial purposes.

It will be then presented the nanomaterials (NMs) and the nano-enabled products (NEPs) developed in a safe-and-sustainable-by-design (SSbD) perspective within the collaborative EU research project ASINA, focusing on the Value Chain1 (VC1), dealing with antibacterial and photocatalytic NMs applied as coating for medical textiles and air purifiers. The functional NMs, designed and applied by a SSbD approach, will be described throughout the entire life cycle and a detailed overview will be provided on: NMs synthesis procedures, large-scale application methods put in place to provide the NEPs and functional characterizations validating the use-stage. Antimicrobial and photocatalytic NMs promote the functionalities transferred on the NEPs. AgHEC, a sustainable synthesis of AgNPs nucleated at room temperature on hydroxyethylcellulose (patented by CNR-ISSMC); TiO<sub>2</sub>-N, a nitrogen-doped titania nanophase (commercial sample provided by Colorobbia); TiO<sub>2</sub>@SiO<sub>2</sub>, a nanophase of titania coupled with silica (optimized by CNR-ISSMC) represent the functional NMs. A set of advanced synthesis modifications, based on SSbD principles and guided by a design of experiment (DoE) tool enabled to achieve a second set of NMs which have been interactively implemented into the life cycle as further SSbD alternatives aimed at increasing the risk/benefit profile.

To conclude an overview of the pathway from emission towards toxicity in a real industrial situation will be shown, presenting the methodology that was used to evaluate the impact of a spray coating process at industrial scale. Deployed real time monitors and off-line sampling techniques will be described. Results from two field monitoring campaigns will be also given. Spray-coating is a widely used industrial technique to deposit a wide variety of different shaped nanoparticles (NPs) on different substrates to produce selfcleaning/self-purifying polyester and plastic surfaces.





The investigated coating process was performed utilizing titanium dioxide nanoforms doped with nitrogen (TiO<sub>2</sub>N) and silver nanoforms capped by hydroxyethylcellulose (AgHEC). Currently, there are no specific international regulations for various ENMs. There are also no Occupational Exposure Limits (OEL) regulated by the European Union (EU) for nanomaterials in the form of nano-objects, their aggregates or agglomerates (NOAA). For ENMs the question of which metric to be used (i.e., mass, surface area, number concentrations) to determine the exposure is still not resolved. The aims of the field campaigns were to assess the worker exposure and risk by inhalation by using all three fundamental metrics: mass, surface area and number concentrations. Furthermore, an estimation of the exposure due to each spray coating conditions, by using conversion factors between gravimetric particulate matter (PM) assessment on filters and real time measurements by optical particles counters (OPC), was obtained. This is a critical aspect since PM determination requires sampling time longer than the spray duration.

### **Speakers:**

**Magda Blosi – CNR - Institute of Science and Technology for Ceramics (ISTEC)**

**Franco Belosi – CNR - Institute of Atmospheric Sciences and Climate (ISAC)**

**Federica Robino – Angel Consulting (Consultancy in cosmetic regulatory affairs)**

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