ABSTRACT:

**Sustainable Multifunctional Nanocomposites for Artwork Protection:
New Perspectives in Coating and Packaging Innovation**

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IPCB-CNR designs and develops multifunctional materials for the protection and accessibility of historical heritage. Incorporating functional nanoparticles enhances the properties of polymers, such as barrier resistance, hydrophobicity, self-cleaning, and anti-corrosion capabilities. These solutions reinforce the role of advanced materials in deep technologies, integrating knowledge from Key Enabling Technologies (KETs). The aim is to create innovative materials for the preservation of historical artfacts and substrates, ensuring effective long-term protection while supporting sustainable production and application. This talk will present key research outcomes from various European projects, including GreenArt, which focus on designing, developing, and validating protective coatings and sustainable foams for packaging applications. In details, mesoporous silica nanoparticles (MSNs) have emerged as highly promising nanocarriers that can be engineered to develop smart nanocomposites capable of releasing corrosion inhibitors in response to external stimuli [1]. Furthermore, sustainable polyurethane foams designed for efficient VOC absorption and easy recyclability through reversible bonding strategies facilitate closed-loop recycling approaches, rendering them a viable solution for sustainable applications [2].

[1] F.Olivieri, R.Castaldo, M.Cocca, G.Gentile, M.Lavorgna, Nanoscale, 13(20), 9091-9111 (2021).
[2] A.Pascarella, F.Recupido, GC.Lama, L.Sorrentino, A.Campanile, B.Liguori, M.Berthet, G.Rollo, M.Lavorgna, L.Verdolotti, Adv. Eng. Mat. 26(7), 2301888 (2024).