Perspective PRIN2022

Consiglio Nazionale delle Ricerche

SCITEC
ISTITUTO DI SCIENZE E TECNOLOGIE CHIMICHE GIULIO NATTA

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Dr. Valeria Di Tullio

Dr. Alessandra Botteon

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Dr. Jana Striova

Finanziato dall'Unione europea
NextGenerationEU

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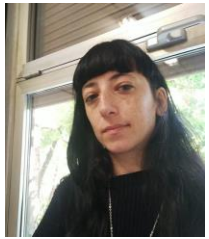

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Unit objectives

CNR Research Unit

CNR coordinates the Project and is responsible of the WP1 and WP4 and participates to the WP2, WP3, WP5 and WP6 activities:

- in WP1 CNR will ensure the project development, the progress and quality of results with respect to the objectives; in collaboration with all the units will promote the dissemination of the results and the communication and transfer of knowledge;
- In WP3 CNR will share the spectroscopic competences and facilities to support the analytical (quantitative) study by non destructive and micro-destructive methods
- CNR will coordinate the activity of the WP4 aimed at the development of non invasive multimodal approach to study the composition of reference and aged materials
- CNR will participate to the activity of WP5 aimed at the development of non invasive multimodal approach to study the mechanical properties of reference and aged materials
- CNR will participate to the pilot studies of WP6 sharing the avaliable non invasive portable facilities for the in-situ studies

Facilities

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- ✓Portable non-invasive single-point spectroscopies and hyperspectral techniques – MOLAB
- ✓Spatially-resolved micro-spectroscopies
- ✓Integrated Brillouin and Raman microspectroscopy
- ✓Solid & liquid-state NMR spectroscopy

Analytical tools to

- ✓ **provide information on compositional and mechanical properties of plastics**
- ✓ **evaluate conservation state (oxidation, depolymerization, deposits)**
- ✓ **monitor conservation treatments (cleaning and protective coatings)**

MOLAB: the mobile laboratory for in situ non invasive analysis of CH objects by portable analytical instrumentation

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Point analysis

- pXRF
- UV-vis-NIR absorption & emission
- Raman (532, 785, 1064 nm), SORS
- Broad range external reflection FTIR

Morphological structural analysis

- OCT
- Profilometry
- NMR relaxometry

Hyperspectral Imaging

- CRONO X-ray scanner
- IRIS X-ray, Vis-NIR-SWIR scanner
- Vis NIR HI(400-1000 nm)
- NIR-SWIR HI (1000-2500 nm)
- MIR HI (4000-1000 cm^{-1})

E-RIHS
EUROPEAN RESEARCH INFRASTRUCTURE FOR HERITAGE SCIENCE

Publications

CNR Research Unit

Martina Alunni Cardinali et al., Microscale mechanochemical characterization of drying oil films by in situ correlative Brillouin and Raman spectroscopy, Sci. Adv. 8, eabo4221 (2022)

F. Sabatini et al. A Thermal Analytical Study of LEGO® Bricks for Investigating Light-Stability of ABS, Polymers 2023, 15, 3267. https://doi.org/10.3390/polym15153267

F. Rosi et al., Unveiling the composition of historical plastics through non-invasive reflection FT-IR spectroscopy in the extended near- and mid-Infrared spectral range. *Analytica Chimica Acta*, *1169*, 33860 (2021) https://doi.org/10.1016/j.aca.2021.338602

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F. Rosi et al., Interpretation of mid and near-infrared reflection properties of synthetic polymer paints for the non-invasive assessment of binding media in twentieth-century pictorial artworks, Microchemical Journal 124 (2016) 898–908 http://dx.doi.org/10.1016/j.microc.2015.08.019

Conti, C., Realini, M., Colombo, C., Sowoidnich, K., Afseth, N.K., Bertasa, M., Botteon, A. and Matousek, P., 2015. Noninvasive analysis of thin turbid layers using microscale spatially offset Raman spectroscopy. Analytical chemistry, 87(11), pp.5810-5815.

J. Striova, A. Dal Fovo, V. Fontani, M. Barucci, E. Pampaloni, M. Raffaelli, R. Fontana, Modern acrylic paints probed by optical coherence tomography and infrared reflectography, Microchemical Journal, 138, 2018, pp. 65-71, https://doi.org/10.1016/j.microc.2017.12.027

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N. Proietti, V. Di Tullio, D. Capitani, et al. Nuclear magnetic resonance in contemporary art: the case of "Moon Surface" by Turcato. Appl. Phys. A 113, 1009–1017 (2013). https://doi.org/10.1007/s00339-013-7729-9

V. Di Tullio et al. Dynamics of diffusion, evaporation, and retention of organic solvents in paints by unilateral NMR and HR-MAS NMR spectroscopy, Microchem. J., 190 (2023), Article 108582, 10.1016/j.microc.2023.108582

A. Motta, G. Seguini, M. Perego*, R. Consonni, A.C. Boccia*, G. Ambrosio, C. Baratto, P.. Cerruti, M. Lavorgna, S. Tagliabue, C. Wiemer. Sequential Infiltration Synthesis of Al2O3 in Biodegradable Polybutylene Succinate: Characterization of the Infiltration Mechanism. Appl. Polym. Mater. 2022, 4, 10, 7191–7203, https://doi.org/10.1021/acsapm.2c01073

Previous Projects

- **2020-2024** – Integrated Platform for the European Research Infrastructure-IPERION-HS (H2020-INFRAIA-2019-1, GA No. 871034).
- **2019-2021** – PON SHINE-Strengthening of the national hub of E-RHIS - European Research Infrastructure for Heritage (PON Ricerca e Innovazione 2014-2020 Finanziamenti finalizzati al potenziamento di infrastrutture di ricerca).
- **2015-2019** – Integrated Platform for the European Research Infrastructure ON Cultural Heritage - IPERION-CH (H2020-INFRAIA).
- **2013-2016** – FUTURAHMA - From FUTurism to Classicism, Research, Art History and Material Analysis (MIUR Futuro in ricerca FIRB 2012).
- **2013-2016** – SICH - Sustainability in Cultural Heritage (PRIN 2010-2011 - MIUR).

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