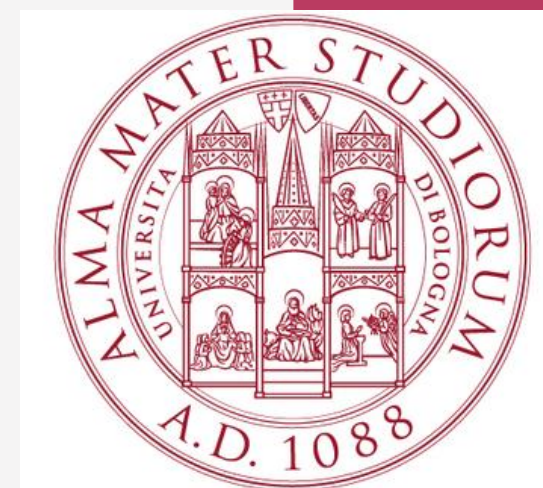


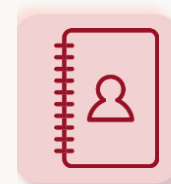
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Unit objectives



WP4

Development, testing and optimization of sustainable cleaning systems

Evaluation of the cleaning performances



Objectives

- Selective removal of surface deposits and unwanted graffiti
- Evaluation of the cleaning efficiency

Materials

- Green organogels
- Electrospun tissues combined with green solvents or green organogels
- Neodymium and argon laser systems
- Other

Assessment

- Photographic documentation (macro and micro)
- Colorimetry
- Spectroscopic techniques
- Chromatographic methods

Mock-ups and case studies

The cleaning systems will be tested on mock-ups prepared *ad hoc* and on historical cases



WP4- DEVELOPMENT OF CLEANING PROCEDURES

Methodology

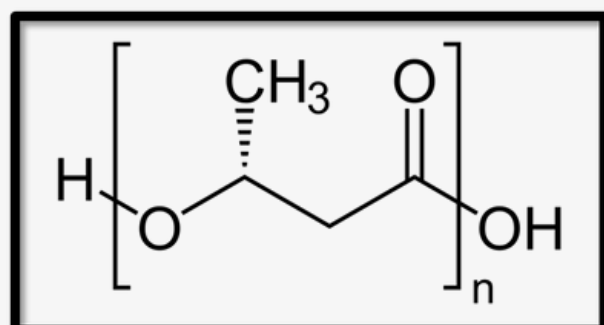
Under development





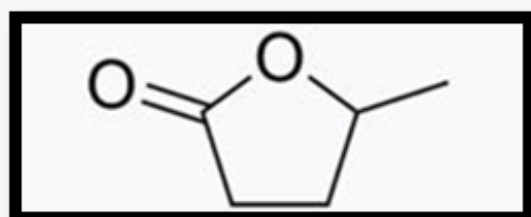
Green organogels

Green polymer

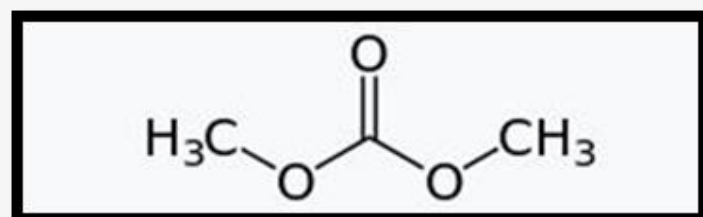


PHB- Poly-hydroxy-butyrate

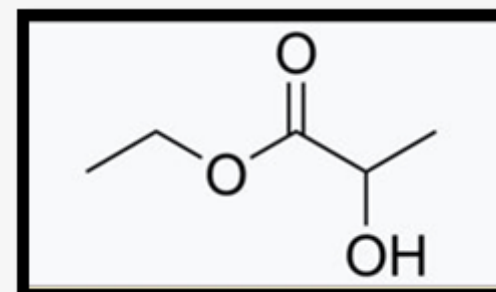
Green solvents



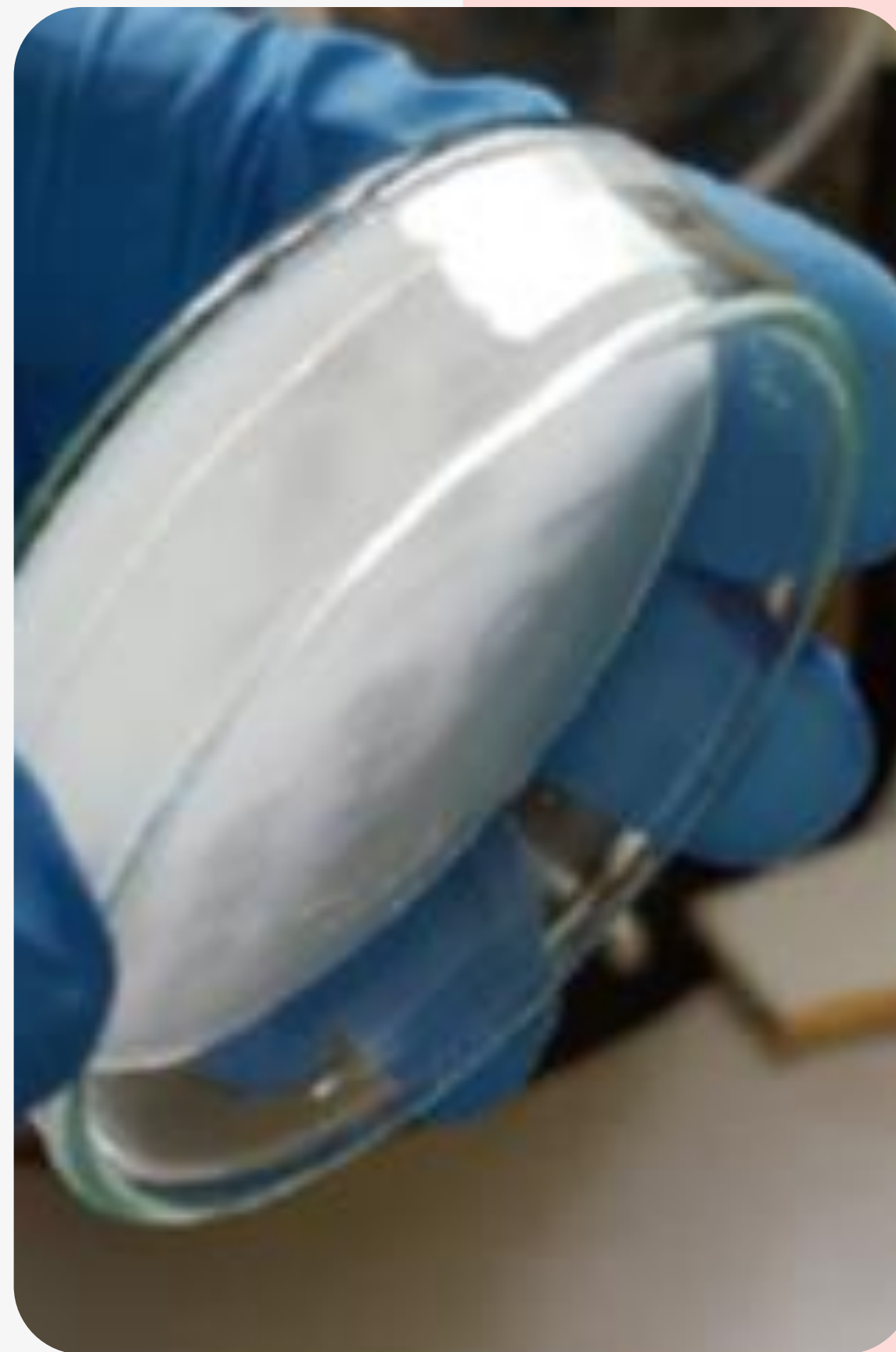
GVL- γ valerolactone

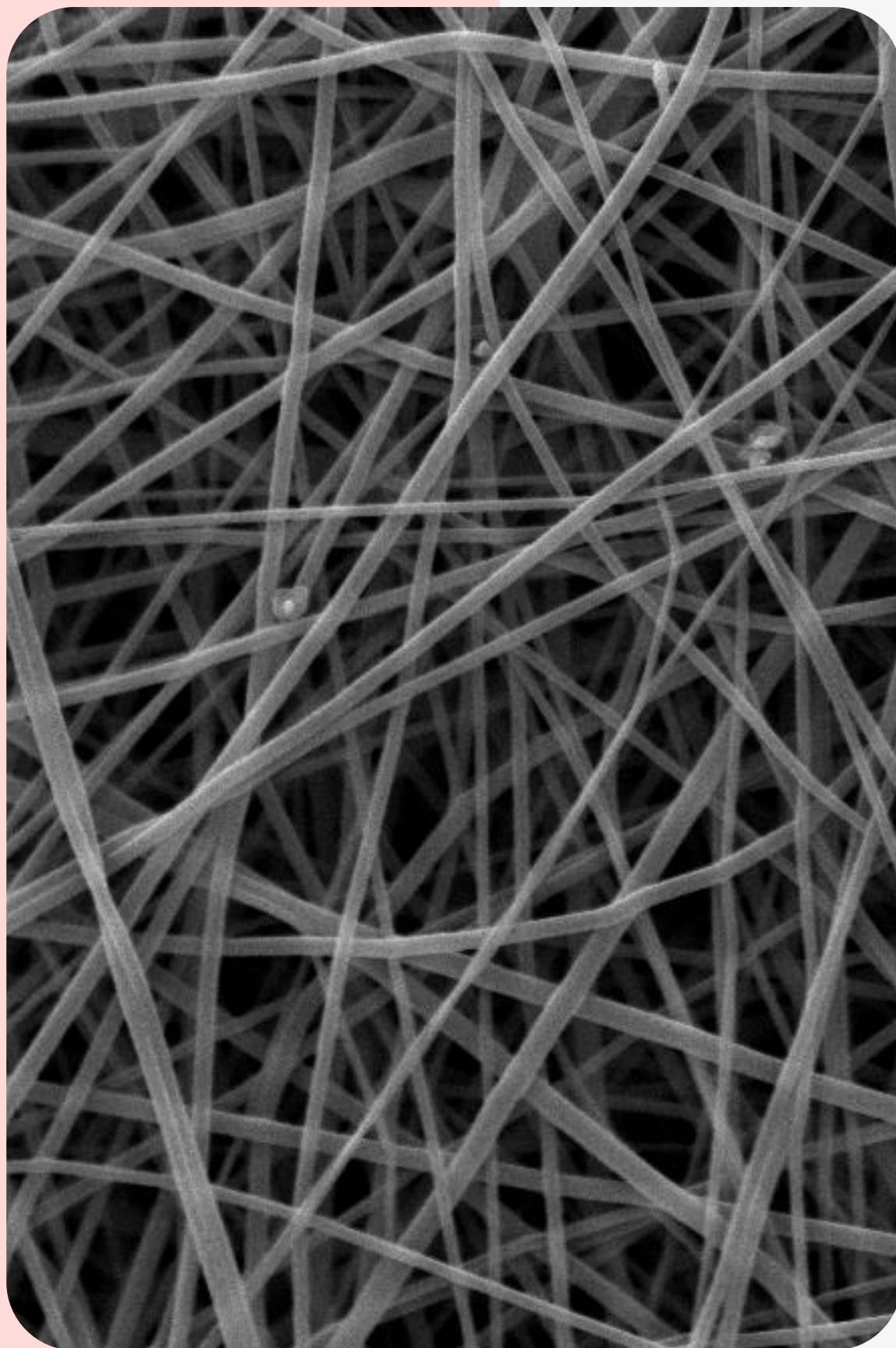


DMC- dimethyl carbonate



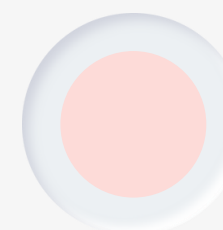
EL- ethyl lactate



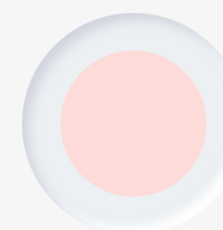


Electrospun tissues

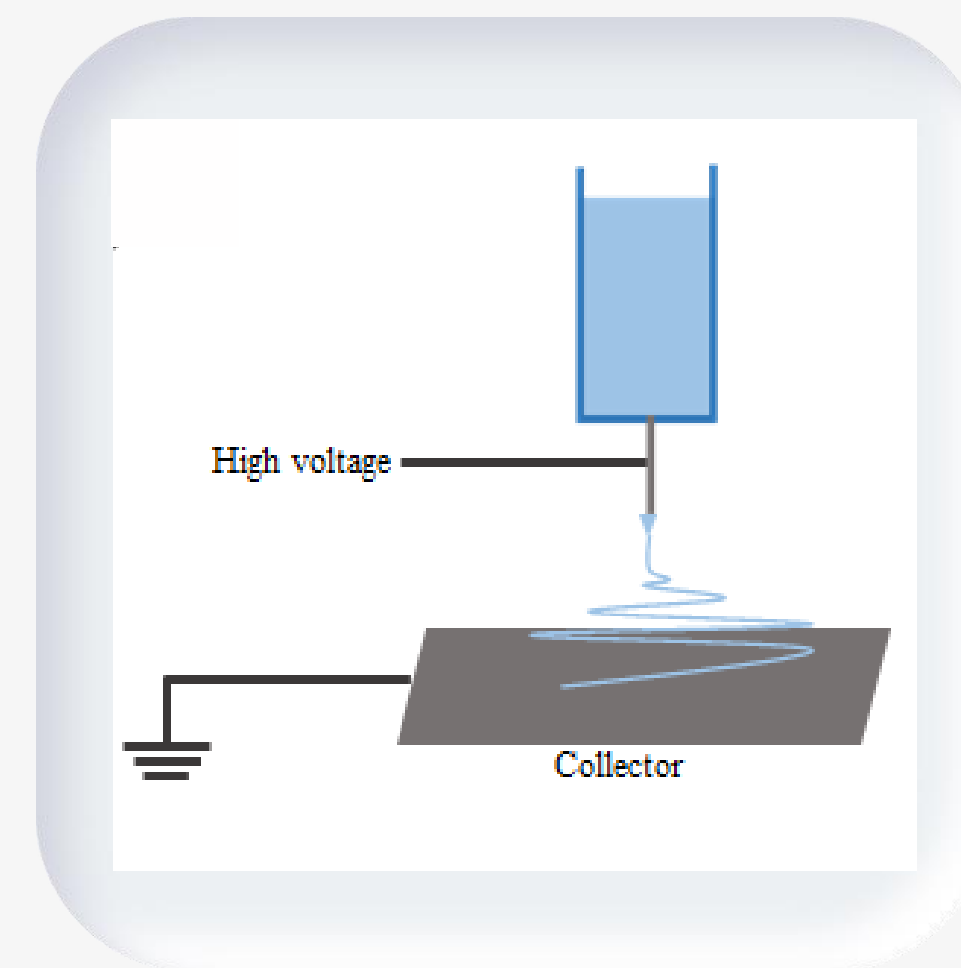
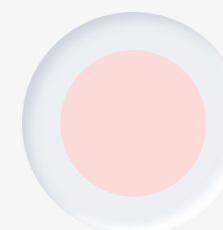
Versatile technique



Highly adsorbent materials



Can be used combined with organogels or neat solvents



Analytical protocol

Optimized



Under
development



**Visual
assessment**



**Microscopic
documentation with
portable microscope
DinoLite**

non- invasive, *in situ*
monitoring

Colorimetry



**Evaluate possible
color alterations**

non invasive, in-situ
monitoring

**Spectroscopy
Chromatography**



**Evaluate residues of
the cleaning
materials and/or
removed
substances**

non/micro invasive,
portable or benchtop

Publications

Jia, Y., Sciutto, G., Botteon, A., Conti, C., Focarete, M.L., Gualandi, C., Samorì, C., Prati, S., Mazzeo, R.
Deep eutectic solvent and agar: a new green gel to remove proteinaceous-based varnishes from paintings
(2021) *Journal of Cultural Heritage*, 51, pp. 138-144.

Jia, Y., Sciutto, G., Mazzeo, R., Samorì, C., Focarete, M.L., Prati, S., Gualandi, C.
Organogel Coupled with Microstructured Electrospun Polymeric Nonwovens for the Effective Cleaning of Sensitive Surfaces
(2020) *ACS Applied Materials and Interfaces*, 12 (35), pp. 39620-39629.

Yiming, J., Sciutto, G., Prati, S., Catelli, E., Galeotti, M., Porcinai, S., Mazzocchetti, L., Samorì, C., Galletti, P., Giorgini, L., Tagliavini, E., Mazzeo, R.
A new bio-based organogel for the removal of wax coating from indoor bronze surfaces
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Prati, S., Sciutto, G., Volpi, F., Rehorn, C., Vurro, R., Blümich, B., Mazzocchetti, L., Giorgini, L., Samorì, C., Galletti, P., Tagliavini, E., Mazzeo, R.
Cleaning oil paintings: NMR relaxometry and SPME to evaluate the effects of green solvents and innovative green gels
(2019) *New Journal of Chemistry*, 43 (21), pp. 8229-8238.

Prati, S., Volpi, F., Fontana, R., Galletti, P., Giorgini, L., Mazzeo, R., Mazzocchetti, L., Samorì, C., Sciutto, G., Tagliavini, E.
6602700040;57199240643;7102429376;7103043791;6602243330;7004386152;6504118967;22986486100;23981675900;35238661600;
Sustainability in art conservation: A novel bio-based organogel for the cleaning of water sensitive works of art
(2018) *Pure and Applied Chemistry*, 90 (2), pp. 239-251.

Samorì, C., Galletti, P., Giorgini, L., Mazzeo, R., Mazzocchetti, L., Prati, S., Sciutto, G., Volpi, F., Tagliavini, E.
22986486100;7103043791;6602243330;7004386152;6504118967;6602700040;23981675900;57199240643;35238661600;
The Green Attitude in Art Conservation: Polyhydroxybutyrate-based Gels for the Cleaning of Oil Paintings
(2016) *ChemistrySelect*, 1 (15), pp. 4502-4508.

Previous projects

- **2022 – in progress: GOGREEN.** GREEN STRATEGIES TO CONSERVE THE PAST AND PRESERVE THE FUTURE OF CULTURAL HERITAGE, Activity: HORIZON-CL2-2021-HERITAGE-01-01
- **2019 – in progress: IPERION HS,** H2020-INFRAIA-2019-1, under GA No. 871034..
- **2015 - 2019: IPERIONCH project.** Work Programme 2014-2015 for European research infrastructures. Funded by the Italian Ministry of Education and Research (MIUR) in the context of call Horizon 2020
- **2019- 2020: Sostenibilita' e beni culturali: green gels per la pulitura di opere d'arte.** Funded by Fondazione del Monte
- **2009 – 2014: CHARISMA: Cultural Heritage Advanced Research Infrastructures: Synergy for a Multidisciplinary Approach to Conservation/Restoration,** EUROPEAN, FP7 INFRASTRUCTURE n.228330
- **2009 – 2012: EU-CHIC, Cultural Heritage Identity Card,** EUROPEAN, FP7-ENV-2008-1
- **2010 - 2012: Setting up of diagnostic methodologies for the stratigraphical characterisation and spatial location of the organic components in artistic and archaeological polychrome works of art,** NATIONAL, PRIN 2008
- **2004 – 2009: Eu-ARTECH,** EUROPEAN, FP7 INFRASTRUCTURE
- **2007-2010: Episcn, European PhD in science for conservation,** EUROPEAN, FF6-MOB