



PhD in INGEGNERIA DEI MATERIALI / MATERIALS ENGINEERING - 39th cycle

**PNRR 118 PA Research Field: DEVELOPMENT OF A METHODOLOGY FOR THE
CHARACTERIZATION AND SUSTAINABILITY EVALUATION OF MATERIALS IN PUBLIC
MUSEUMS**

Monthly net income of PhDscholarship (max 36 months)

€ 1400.0

In case of a change of the welfare rates during the three-year period, the amount could be modified.

Context of the research activity

**Motivation and objectives of the research
in this field**

Italy cultural heritage is rich and important, especially public historical buildings and museums represent the inheritance from the past and the legacy for the future. Public museums and works of art are important resource for economic growth but their environmental impact has to be evaluated. The European Community clearly defines sustainability as one of the pillars in the framework for action on cultural heritage and that a balance between access to cultural heritage and sustainable cultural tourism is important <https://ec.europa.eu/culture/cultural-heritage/cultural-heritage-eu-policies/sustainability-and-cultural-heritage> this also includes the sustainability of museum buildings within the European Green Deal. Similarly, the recovery and resilience plan (PNRR) aims to support Italy becoming more sustainable, resilient and ready for the green transition. The major challenge is energy efficiency in public buildings, like museums, that require focused analysis. Therefore, the aim of the project is to support Public Authorities (PA) to adopt the sustainability requirements. However, objects and museum buildings have an intrinsic fragility due to environmental degradation, pollutants, humidity and poor construction material. So the project goals are to perform compositional characterization of the ceramic objects and the building material of the museum at Forte Sangallo in Civita Castellana (Viterbo) to assess a new sustainable approach for the museum display and management,



	improving a heritage building.
Methods and techniques that will be developed and used to carry out the research	• The following compositional techniques will be applied: Portable X-Ray Fluorescence (pXRF) to collect non-destructive chemical elemental data on samples; • X-Ray Diffraction (XRD) analysis to identify and quantify crystalline phases in the samples of objects and building materials; • FT-IR (Fourier Transform Infrared analysis) to identify the presence of potential organic pollutants; • Thermogravimetric Analysis and Differential Thermal Analysis (TG-DTG) to determine presence of mineral phases. • Software for data interpretation (i.e. GSASS, Profex) Other methodologies applied • Sustainability Life Cycle Assessment, i.e. environmental Life Cycle Assessment (LCA), Social Life Cycle Assessment (S-LCA), Life Cycle Costing (LCC); • LCA software (i.e. Simapro, OpenLCA)
Educational objectives	The research will activity contribute in forming a professional expert in sustainability assessment with a special focus on materials in a public administration. Also training a researcher that can technically interact with public administrations, is another major educational goal of this project.
Job opportunities	There is an increasing demand of highly trained scientific professionals with an expertise in materials as well in sustainability studies on Public administrations and adaptive re-use of heritage buildings to comply with the new EU policy.
Composition of the research group	1 Full Professors 2 Associated Professors 1 Assistant Professors 6 PhD Students
Name of the research directors	Prof.ssa Gallo Stampino



Contacts

<https://mat4en2.cmic.polimi.it/>

<https://www.cmic.polimi.it/ricerca/elenco-gruppi-di-ricerca/mat4en2/>

Additional support - Financial aid per PhD student per year (gross amount)	
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Housing - Foreign Students	--
Housing - Out-of-town residents (more than 80Km out of Milano)	--

Scholarship Increase for a period abroad	
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Amount monthly	700.0 €
By number of months	6

National Operational Program for Research and Innovation	
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Company where the candidate will attend the stage (name and brief description)	Forte Sangallo Museo dell'Agro Falisco - Via del Forte n°1, 1033 Civita Castellana (VT) - https://www.fortesangallo.beniculturali.it/
By number of months at the company	6
Institution or company where the candidate will spend the period abroad (name and brief description)	Masaryk University, Brno, Czech Republic - https://www.muni.cz/en
By number of months abroad	6

Additional information: educational activity, teaching assistantship, computer availability, desk availability, any other information

Individual budget for research (5.700 euro): 1st year: 1.900 euro; 2nd year: 1.900 euro; 3rd year: 1.900 euro

Teaching assistantship (availability of funding in recognition of supporting teaching activities by the PhD student): there are various forms of financial for activities of support to the teaching practice. The PhD student is encouraged to take part in these activities within the limits allowed by the regulation.