Acronym – GRENATE

Title - New Insights in the Mechanical Modeling of Cultural Heritage for Sustainable Restoration: Green Composites and Nano-Technologies

Scientific coordinator – Daniele Baraldi

Department – Department of Architecture and Arts

ERC sector – PE8

Principal Investigator – Nicholas Fantuzzi

Organization of PI – Alma Mater Studiorum – University of Bologna

Iuav role – partner

Other partners – "La Sapienza" University of Rome

Duration – 24 months

Start – 28/09/2023

Closure – 27/09/2025

Project budget – € 359 779.00

Iuav budget – € 120 468.00

Funding to Iuav – € 73 555.00

Source of funding – MUR (Ministry of University and Research) - Call PRIN 2022

Description – Cultural heritage is of paramount importance for the Italian territory due to the presence of a great number of ancient structures with historical and archeological interest. The main aim of Italian culture is based on preservation, conservation and restoration of architectural heritage, however, these aspects are very complex when set in the context of structural mechanics due to different constructive typologies present on the national territory which is characterized by high seismicity. This is a threat for such structures which in general have poor resistance to horizontal actions. Therefore monitoring and acting on these structures becomes an open challenge for structural engineers especially when green technologies come into place due to the several environmental threats led by modern human beings. There is a need for theoretical and numerical modeling of green-nanocomposites to be considered in this context by taking into consideration the interdisciplinary and interoperability actions needed for such designs.

Objectives – A research team, expert in the area of structural mechanics, will drive the main Work Packages (WPs) of the project:

- MECHANICAL MODELING focusing on constituent materials and related constitutive aspects, treated using discrete or non-standard continuous multiscale approaches;

- NUMERICAL IMPLEMENTATION using advanced computational tools;

- EXPERIMENTAL VALIDATION for material and geometrical characterization, with next-generation materials and devices for monitoring and control of vibrations, dissipation and damage.