

Special Session

Bio-based Materials for Resilient Structures in Seismic Areas

Organizers

- **Angelo Aloisio**
Università degli Studi dell'Aquila, Dipartimento di Ingegneria Civile, Edile-Architettura e Ambientale (DICEAA), angelo.aloisio@univaq.it
- **Cristoforo Demartino**
Università degli Studi Roma Tre, Dipartimento di Architettura, cristoforo.demartino@uniroma3.it
- **Antonio Sandoli**
Università del Molise, Dipartimento di Bioscienze e Territorio, Via Francesco de Sanctis 1, 86100, Campobasso, Italy, antonio.sandoli@unimol.it
- **Vittoria Borghese**
TNO - Netherlands Organisation for Applied Scientific Research, vittoria.borghese@tno.nl
- **Giovanni Muciaccia**
Politecnico di Milano, Dipartimento di Ingegneria Civile e Ambientale (DICA), giovanni.muciaccia@polimi.it
- **Massimo Fraggiacomo**
Università degli Studi dell'Aquila, Dipartimento di Ingegneria Civile, Edile-Architettura e Ambientale (DICEAA), massimo.fraggiacomo@univaq.it

Overview

The construction sector is increasingly challenged to reduce carbon dioxide emissions amid growing environmental concerns. Bio-based materials—sourced from renewable resources like wood, bamboo, straw, hemp, flax, broom, and mycelium—present a promising alternative for sustainable, low-impact construction. However, their effective use in seismic regions demands a thorough understanding of their mechanical behavior and the development of innovative design strategies to optimize performance and address potential limitations.

This special session provides a multidisciplinary forum to explore both the opportunities and challenges of employing bio-based materials in seismic contexts. Our aim is to stimulate research and foster innovative solutions that integrate seismic resilience with the energy efficiency and sustainability benefits of bio-based materials. By encouraging dialogue among researchers, engineers, architects, industry experts, and policymakers, we seek to accelerate the shift toward more sustainable and resilient construction practices in earthquake-prone areas.

Topics of interest include, but are not limited to:

- **Characterization and Structural Behavior of Bio-based Materials:** Mechanical properties, durability, and seismic response of wood, bamboo, and other bio-based and composite materials.
- **Innovative Bio-based Construction Systems for Seismic Areas:** Development and design of structures, components, and construction details made with bio-based materials for new buildings—possibly hybrid—and for the strengthening of existing buildings.
- **Modeling and Seismic Analysis of Bio-based Structures:** Numerical and experimental methodologies for assessing the seismic response, vulnerability, and resilience of bio-based buildings.
- **Regulatory Aspects, Standardization, and Sustainability:** Regulatory issues, certification, life cycle assessment (LCA), and overall sustainability evaluation of bio-based construction in seismic zones.
- **Applications and Case Studies:** Presentation of completed or ongoing projects that use bio-based materials in seismic contexts, focusing on experiences and best construction practices.