

THEMATIC SYMPOSIUM: 1st Announcement

FATIGUE AND FRACTURE BEHAVIOUR IN EMERGING AND GREEN MATERIALS

The demand for materials that combine high performance with environmental sustainability is rapidly growing across multiple engineering sectors. Understanding the fracture and fatigue behaviour of both innovative and eco-friendly materials is essential for ensuring structural reliability and promoting their wider adoption. This thematic symposium aims to bring together advances in mechanical characterization and design strategies for next-generation materials capable of meeting both technological and ecological challenges.

To delve deeper into this critical topic, we are pleased to announce the **Thematic Symposium entitled “Fatigue and fracture behaviour in emerging and green materials”**. This symposium offers a unique platform for researchers, engineers, industry professionals, and students to exchange knowledge and explore the latest challenges, scientific developments, and engineering solutions related to the fracture and fatigue behaviour of both innovative and environmentally sustainable materials.

The symposium, promoted by TC3 of ESIS and by the Italian Group of Fracture, will be chaired by Sabrina Vantadori and Francesco Iacoviello.

Key topics

The symposium will cover a wide range of theoretical, experimental, and applied aspects, including:

Fatigue and fracture behaviour of novel metallic, polymeric, ceramic, and composite materials. This topic focuses on understanding how innovative material systems respond to cyclic and fracture loading conditions, with particular attention to new-generation alloys, polymers, ceramics, and hybrid composites.

Sustainable materials design and durability under mechanical loading. Contributions are encouraged on the development and mechanical assessment of materials designed with sustainability criteria, including recyclability, low environmental impact, and long-term durability.

Microstructural effects on crack initiation and propagation in eco-friendly materials. This area investigates the relationship between microstructural features—such as grain size, phase distribution, and reinforcement morphology—and fatigue/fracture mechanisms in green materials.

Experimental and numerical approaches to fatigue life prediction in advanced materials. Research studies addressing novel testing methods, lifetime modelling techniques, and multiscale simulations for predicting crack growth and fatigue failure in advanced material systems are welcomed.

Green manufacturing processes and their influence on structural integrity. This topic covers the impact of sustainable manufacturing technologies, such as additive manufacturing or low-emission processing, on the mechanical performance and reliability of structural components.

Featured Speakers

The symposium will host renowned international experts from academia and industry who will share their experiences and the latest findings in the field. Topics will include case studies, advanced theoretical models, and cutting-edge technological solutions.

This TS is organised in the context of two projects coordinated by Sabrina Vantadori.

The project MUR PRIN 2022, entitled ***“Preparation and performance of PCs with nanostructures for civil engineering projects”*** - CUP D53D23004250006 - ***Università di Parma and Università di Napoli Federico II***. The final goal of the present project is to propose a novel paving material, with a significant potential to be industrialised, characterized by a suitable durability, able to decrease the stormwater pollution and to mitigate the problem of stormwater runoff in urban areas. Sabrina Vantadori is the PI of this project.

The project MUR PRIN 2022 PNRR- M4C2 “Dalla Ricerca all'Impresa” Investimento 1.1 Avviso MUR n. 1409 del 14 settembre 2022 - Funded by the European Union - NextGenerationEU, entitled ***“Towards innovative methodologies to design metallic Additive Manufactured (AM) complex components for civil engineering structures subjected to time varying loading”*** - CUP D53D23018580001 - ***Università di Roma La Sapienza and Università di Parma***. The final goal of the present project is to propose innovative methodologies for design-against-fatigue of notched small-scale AM metallic parts used in civil engineering structures. Sabrina Vantadori is the leader of the University of Parma research unit.