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### Novel cementitious composites for enhanced energy efficiency in NZEBs and air-cleaning performance

by

**Dr. Antonio Caggiano, PhD**

*Tenure-track Assistant Professor*

*DICCA, Dept. of Civil, Chemical and Environmental Engineering, University of Genoa,  
Via Montallegro 1, Genova 16145, Italy.*

*E-mail: [antonio.caggiano@unige.it](mailto:antonio.caggiano@unige.it)*

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Climate change and environmental degradation due to greenhouse gas emissions and pollution needs ambitious policies and close international cooperation and partnerships to make our world climate-neutral. In this sense the EU commission recently launched the European Green Deal which has the main aim to make EU climate neutral by 2050. To reach this target will require actions by all sectors, also ensuring buildings to be more energy efficient. With the introduction of the 2019/21 European Buildings Directive, it has been emphasized that new buildings of the EU-States must be designed as “Nearly-Zero-Energy Buildings” (NZEBs).

In this context, this talk has the main aim of sharing the recent developments and future trends on experimental research and numerical tools dealing with the integration of Phase Change Materials in porous systems for thermal energy storage for the construction and building sector. A wide range of research outputs on Normal-to-Highly Porous PCM Cementitious Composites and related numerical research by employing micro-to-meso scale approaches, which are contributing to enhance energy-efficient and sustainable materials to be used for residential and non-residential buildings, will be disseminated. Finally, a novel TiO<sub>2</sub>-cementitious Foam as further extension of the PCM-FOAM, to possibly employ Photocatalyst components for air cleaning purposes in combination of energy saving, is presented.

#### **Biography:**

Dr. Antonio Caggiano is senior researcher at DICCA department of UniGE. He worked at the *Institut für Werkstoffe im Bauwesen* of TU Darmstadt, as group leader (2020-2022) and part of the coordinator team of the EU-H2020 project Integrated porous cementitious nanocomposites in non-residential building envelopes for green active/passive eNeRGy STORAGE (NRG-STORAGE, number 870114, [www.nrg-storage.eu](http://www.nrg-storage.eu)). He was Humboldtian between 2017-2020, member of the Argentine Council for Scientific and Technological Research (CONICET) and has been Adjunct Professor at the University of Buenos Aires. He made his PhD (2009-2013) with double degree between UniSA and UNT (Tucuman-AR). He is specialized in computational mechanics, multiscale and multi-physics modelling of cementitious systems. Fracture mechanics, transport phenomena, thermal energy storages, energy efficiency and self-healing mechanisms of construction and building materials are also part of his expertise and research interest.

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