
Innovative Materials for Sustainable Construction

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Abstract

The environmental context requires the development of sustainable construction with low impact all along its life cycle. Materials are an attractive avenue to meet such challenge, and particularly, emerging materials with low carbon dioxide foot print (rammed or poured earth, geomaterials, by-products valorization, bio-based materials) and energy management through materials (super isolation, energy storage). The difficulty generally stands on antagonism in functional properties required. Understanding phenomena involved at different scales from nano- to macro-scale is a real bottleneck for those materials.

Innovative materials development requires different steps and different strategies. At the beginning, formulation, rheology and shaping are the main concerns. Model materials or simplified systems make it possible to anchor new techniques and methods. Then, functional properties have to be related to the microstructure. Some modelling approaches exist (analytical models, homogenization, molecular dynamics, discrete elements or finite elements) and are often coupled to gain new insights. Finally, constitutive mechanical laws are available, durability and aging mechanisms are studied so as to design a building system. This requires multiscale approaches, durability investigations and properties scale-up. All TRL degrees are expected for this mini-symposium, whether at an academic (TRL 2-5) or industrial (5-8) level.

Materials development, new experimental techniques on simplified or complex systems as well as related computational models, addressing physical phenomena and times scale relevant for these innovative materials are welcome. Innovative and multidisciplinary approaches focused on mechanical behavior and or durability mechanisms as well as predictive model increasing either price/efficiency ratio or safety or sustainability and durability in service are encouraged.

Keywords: Geomaterials, Valorization, Super insulation materials, Mechanical properties, Durability

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