Editorial: Biobased and bioreceptive building materials

The building and construction sector is a major contributor to greenhouse gas emissions, and thus the speed of climate change. Buildings and civil infrastructure directly impact the environment throughout their life cycle, often monitored by a 'cradle-to-grave' analysis. This life cycle analysis covers various stages including materials production, manufacturing, transportation to the site, construction, in-use phase, maintenance, renovation, demolition, and waste management. To minimise the toll of the sector on the environment, either from CO_2 emissions or from the depletion of planet resources, using sustainable materials is one of the best strategies. This is particularly because contrary to e.g. transportation sector, a big part of the LCA impact comes from the materials and construction phase and less from the in-use phase.

Irrespective of whether construction materials are sourced from renewable or non-renewable (fossil-based) resources, it is pivotal for life cycle impact if the materials can withstand the combination of environmental and mechanical loads during their service life, demonstrating competitive durability. The best situation would then be to utilise materials which are both sustainable in origin and have high durability. Moreover, sustainable construction encompasses several other aspects too, including the use of materials with low embodied energy, lower energy manufacturing methods, recycling, reuse, and end-of-life scenarios.

In this context, bio-based materials offer high potential for sustainable construction in various areas compared to conventional construction materials (e.g. steel, concrete, asphalt, aluminium, and glass) that often deplete the planet's natural resources and also require high amounts of fossil-based energy to manufacture.

Bio-based materials such as wood, natural fibres, bio-based FRP composites, mycelium, and biobased polymeric matrices normally require small to modest amounts of energy to acquire and can even store biogenic CO_2 for a long time, since they are, as a whole, obtained from plants or their building blocks are procured from living systems or biomass.

Several research articles on bio-based construction materials are presented in this special issue to exemplify various current scientific challenges and research topics within the field. The topics presented are strategies to improve the durability of bio-based FRP composites, damage tolerance in bio-based FRP composites, environmental effects on the durability of wood adhesive bonding, and a review of the potentials of bioreceptive concrete in construction.

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