

Rethinking Buildings: Alternative Construction Materials

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In 2020, global consumption of raw materials reached above 90 billion tons while greenhouse gas emissions (GHG) from the production of materials as a share of global GHGs increased from 15% in 1995 to 23% in 2015. The European building construction sector accounts for 42% of total energy consumption, 35% of total greenhouse gas emissions, 50% of extracted materials and 30% of water consumption. The project presented is founded on three main strategies which include resource efficiency, circular economy, and renewable materials to tackle the impacts of construction and other materials-intensive industries on GHGs. With this project, development of “NEWood” as a new class of bio-based, resource-efficient, and low carbon footprint material is being investigated using only wood waste and agricultural waste combined with mushroom mycelium as a natural binder without the need for any synthetic binders.

The root structure of filamentous fungi, mycelium, provides an alternative to synthetic and bio-based adhesives. In a highly efficient biological process, filamentous fungi feed on substrates such as lignocellulosic waste materials and form mycelium, which acts as a natural binder of the substrate. In this way, products can be manufactured in an environmentally friendly way that have the potential to replace various energy-intensive building materials.

NEWood is a 100% biobased replacement for timber and engineered wood products and is produced following a circular economy model where no freshly cut wood and synthetic binders is used while at the end of its life cycle no waste will be left behind. NEWood aims to have comparable properties to engineered wood products such as Medium Density Fiber boards (MDF) and particleboards while offering a sustainable material alternative.

The project gives an overview of production technique and mechanical testing of NEWood as well as the prototypes in which NEWood has been used. The outcomes of this presented work will be a range of established properties for NEWood with enhanced production and processing parameters. Additionally, the production of proof of concept and proof of value prototypes with NEWood helps in increasing awareness within the society and industrial partners with respect to the application of biobased

and renewable materials to support the global efforts in reducing the environmental footprints of the construction industry.