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Bio-composite materials potential in enhancing sustainable construction

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ABSTRACT

According to the sustainability principles, building should have zero-embodied energy in order to minimize the amount of carbon. In previous practices, construction materials have been composed with non-recyclable materials and after demolition of buildings the debris were put on different landfills. Nowadays, most of the material manufacturers have shifted their concerns to produce materials by using renewable resources, and also gained opportunity in utilizing wasted streams. The proposed biomaterials have been produced using natural fibers which reinforce biodegradable polymeric, in which naturally occurring aliphatic thermoplastic polyesters are produced by microbes via bacterial fermentation in carbon-rich environments. The composite material produced exhibits comparable properties to structural grade wood and is rapidly biodegradable in specific anaerobic conditions, at the end of its useful life. Using anaerobic digester sludge from local wastewater treatment plants as the biodegradation medium, the material decomposes into biogas that consists mostly of inert gases and, of particular interest, methane, which can be captured and used either as a biofuel or as a closed-loop carbon source. This paper documents bio-based composite material development, durability issues, anaerobic biodegradation, and potential industrial applications.

Keywords: Bio-composites; Sustainable building construction; Construction industry

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