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CarbonEX

Background

U.S. wood-constructed housing stock accounts for 750 million tons of sequestered carbon and can reduce CO₂ emissions by replacing energy intensive materials including cement and steel. Currently popular manufactured woods such as oriented strand board (OSB) and cross laminated timber (CLT) have low durability and require adhesives that are mainly petroleum-based, and can be toxic.

In order to enhance durability and eliminate the need for adhesives, the use of recycled plastics has gained interest in manufactured wood. Wood plastic composites (WPCs) resist decay and biological threats, but most WPCs are challenged by modest flammability, irreversible deformation (creep) under prolonged load, and the need for fossil-carbon-based resources (plastics).

Invention Description

Researchers at Arizona State University have developed a novel carbon-negative reinforcement and wood plastic composite, CarbonEX, that utilizes functionalized carbon made from biomass or non-biogenic sources. This invention uses bio-based functionalized carbon as an alternative to fossil-based thermoplastics that serve as continuous matrix phase in wood composites. CarbonEX provides carbon-negative building materials that provides enhanced performance characteristics by utilizing carbon made from direct air capture (DAC) carbon dioxide.

Potential Applications

- Building materials with increased sustainability and lower processing cost
- Improved wood plastic composites (WPCs)

Benefits & Advantages

- Improves strength of recycled plastics
- Eliminated traditional binders used in manufactured woods, which pose health risks to humans and the environment
- Reduces the flammability of WPCs
- Reduces carbon footprint of building materials
- Sustainable and low cost approach using functionalized carbon from biomass

