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UMaine's new patent leverages the state's forest products industry

COURTESY / UNIVERSITY OF MAINE

Seen here is particleboard whose binding is an environmentally friendly cellulose nanofibrils slurry, developed by the University of Maine.

- By Staff

The University of Maine has received a patent for a process that creates construction materials using an environmentally friendly binding agent.

The process developed by UMaine researchers eliminates the use of formaldehyde as a binding agent for construction materials such as particleboard, and replaces it with a slurry of cellulose nanofibrils, according to a news release. The use of the slurry increases durability and eliminates formaldehyde off-gassing.

Cellulose nanofibrils are the natural structural building units of wood, and are 1/100,000th the width of a human hair.

The university is a partner in FOR/Maine, a cross-sector collaboration between industry, communities, government, education and nonprofits that seeks to innovate and grow Maine's forest economy.

"UMaine's ongoing research and technology development in this area is critically important to the forest sector here in Maine," Steve Schley, chair of the FOR/Maine executive committee, said in the release. "Cellulose nanofibrils can be refined from wood waste products and any innovation that expands their use contributes to the full utilization of a renewable local resource and supports one of Maine's traditional industries."
The technology can be used to create a variety of commonly used building materials. The primary application for the patent focuses on a replacement for particleboard, which is used widely for furniture and countertops.

Particleboard is traditionally manufactured from wood chips bound with a synthetic resin that typically contains formaldehyde, which is classified as a known human carcinogen.
The use of cellulose nanofibrils results in a product that better resists fracture, and sequesters carbon and oxygen into the building product for its life span, which is typically decades.

The UMaine inventor is professor of chemical and biomedical engineering Doug Bousfield. Co-inventor is Michael Bilodeau, the former director of UMaine's Process Development Center, a commercial-scale pilot plant on campus devoted to pulp and paper research and development.

Mehdi Tajvidi, associate professor of renewable nanomaterials, also is a leading UMaine researcher in this area and is developing related technology as part of P3Nano, a public-private partnership founded by the U.S. Endowment for Forestry and Communities and the U.S. Forest Service.

"CNF technology could transform the way we make not only building materials, but a host of other products," Bousfield said in the release. "Particleboard is only one potential application. A similar process could be used to create composite fiber board for insulation, cements, and even paint. We are also researching alternatives to single-use plastics for applications such as food packaging, drink lids and utensils."

UMaine's PDC is the only publicly accessible U.S. facility that can manufacture CNF at a rate of one ton per day. The center supplies CNF and cellulose nanocrystals to academic, public and private research groups interested in evaluating and developing applications for the materials.

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