Fraunhofer shows bio-tiles and heat-resistant biopolymers

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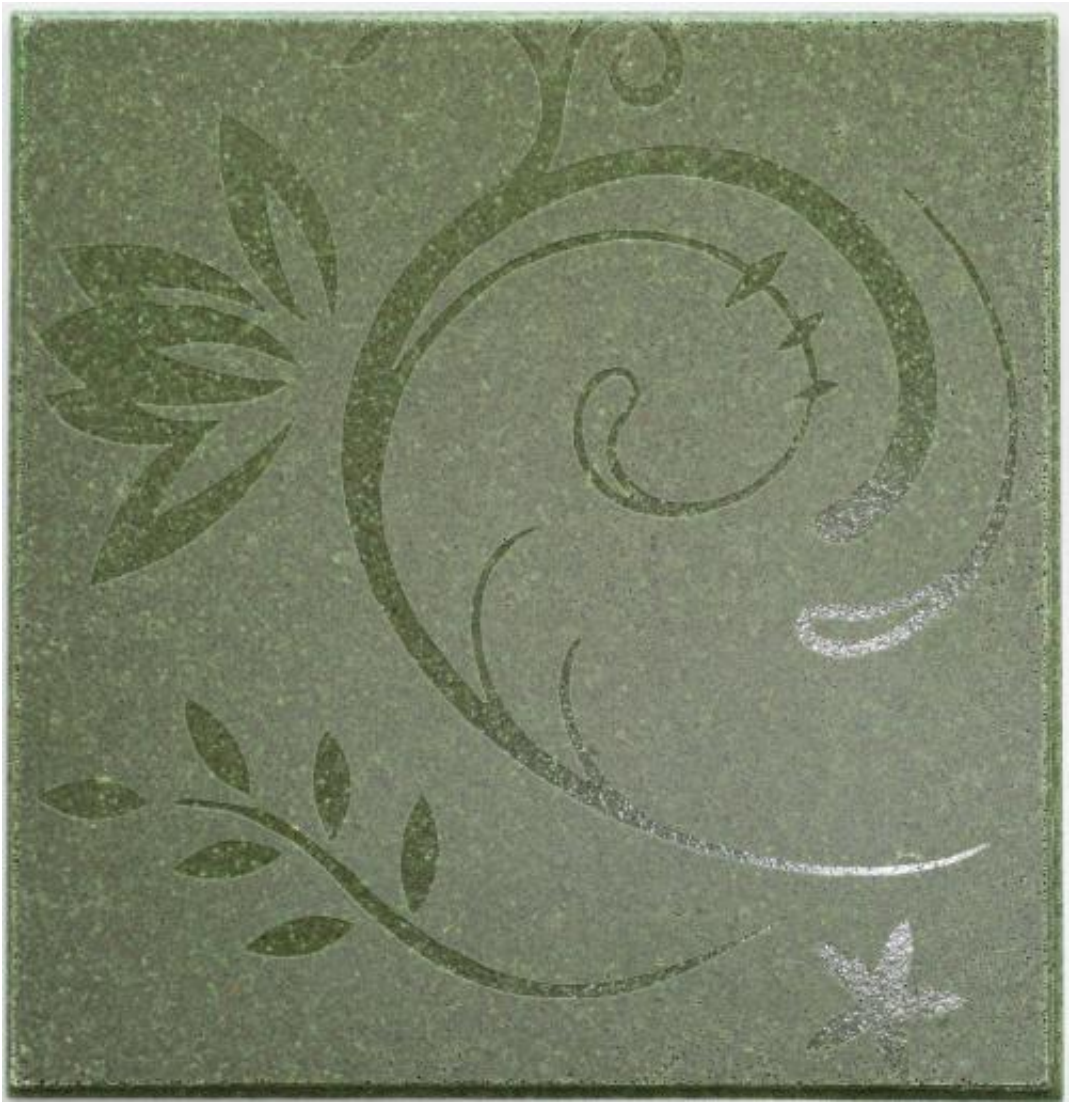

This bio-tile not only comes with an excellent ecological balance, it even unlocks new design options. Credit: Fraunhofer IWM

Fraunhofer researchers are exhibiting how renewable, biodegradable and biostable raw materials can be used in architecture, interior design and the packaging industry at this year's International Green Week in Berlin from January 18 to 27 (Hall 5.2a, Booth 103).

They consist of a mixture of linseed oil epoxy, various natural fibers and diatomaceous earth, a material that is procured from fossilized diatoms. New bio-based tile systems, like the ones designed at the Fraunhofer Institute for Mechanics of Materials IWM in Halle, are more environmentally friendly, lighter-weight and – depending on their manufacturing and material properties – more resource- and energy-efficient than conventional ceramic materials. "The composite is not hard as glass and brittle like conventional epoxy, but flexible and more pliable instead. This makes it easier to work with the tiles," as Andreas Krombholz, scientist in the natural composites division at IWM, describes another advantage. They also put a completely new spin on architectural perspectives. In the molding process, they can be shaped on an entirely customized basis, and shaped into squares, triangles or circles, for example. Even patterns and colors can be tailor-made.

Another design advantage: By adding fluorescent pigments to the blend, they are transformed into light tiles. This means they can be used both outdoors and indoors, serving as illuminated guideposts on floors and walls. The same bio-tiles can also be installed in kitchens and bathrooms and can serve as indoor floor coverings. There are cost benefits to both producer and customer here: this is because the tiles can handle the impact noise abatement directly, so an entire work step can be dropped from the production process.

Heat-resistant plastic from corn starch

The packaging industry is increasingly using biopolymers made from polylactides (PLAs) as an environmentally friendly alternative to

petroleum-based plastic. They are obtained from corn starch and completely biodegradable. Previously, however, PLA began to soften at about 60 ºC, so it was not suitable for heat-intensive processes. But now, researchers at the Fraunhofer Institute for Applied Polymer Research IAP in Potsdam have found a way to make this bioplastic even more heat-resistant. An interesting application comes from the food industry: The filling of yogurt in plastic cups, because this process takes place at higher temperatures. Cups made of PLA stereo complexes retain their shape and remain stable even at temperatures of up to 120 ºC. Dr. Johannes Ganster, division director at IAP, explains the principle behind this: "To make PLA plastics more form-stable at higher temperatures, we introduced stereo complexes with special components of L-lactides and D-lactides. These right-and-left rotating molecules complement each other and make the bond even more stable."

Corporations have already expressed tremendous interest, because the potential is massive. Production of biopolymers made of PLA is independent of the growing scarcity of petroleum. In addition, they can be readily composted, and they are ideal for recycling by decomposition in lactic acid. The greatest advantage is that they have since become just as durable and sturdy as any petroleum-based plastic, and can even be used for other products, such as protective films, computer housing and shopping bags. IAP is already working closely with a German factory builder that intends to incorporate the new process into its business operations soon.

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