BICYCLES

Self-curing resin finds use in a tougher bicycle helmet

By Ben Coxworth
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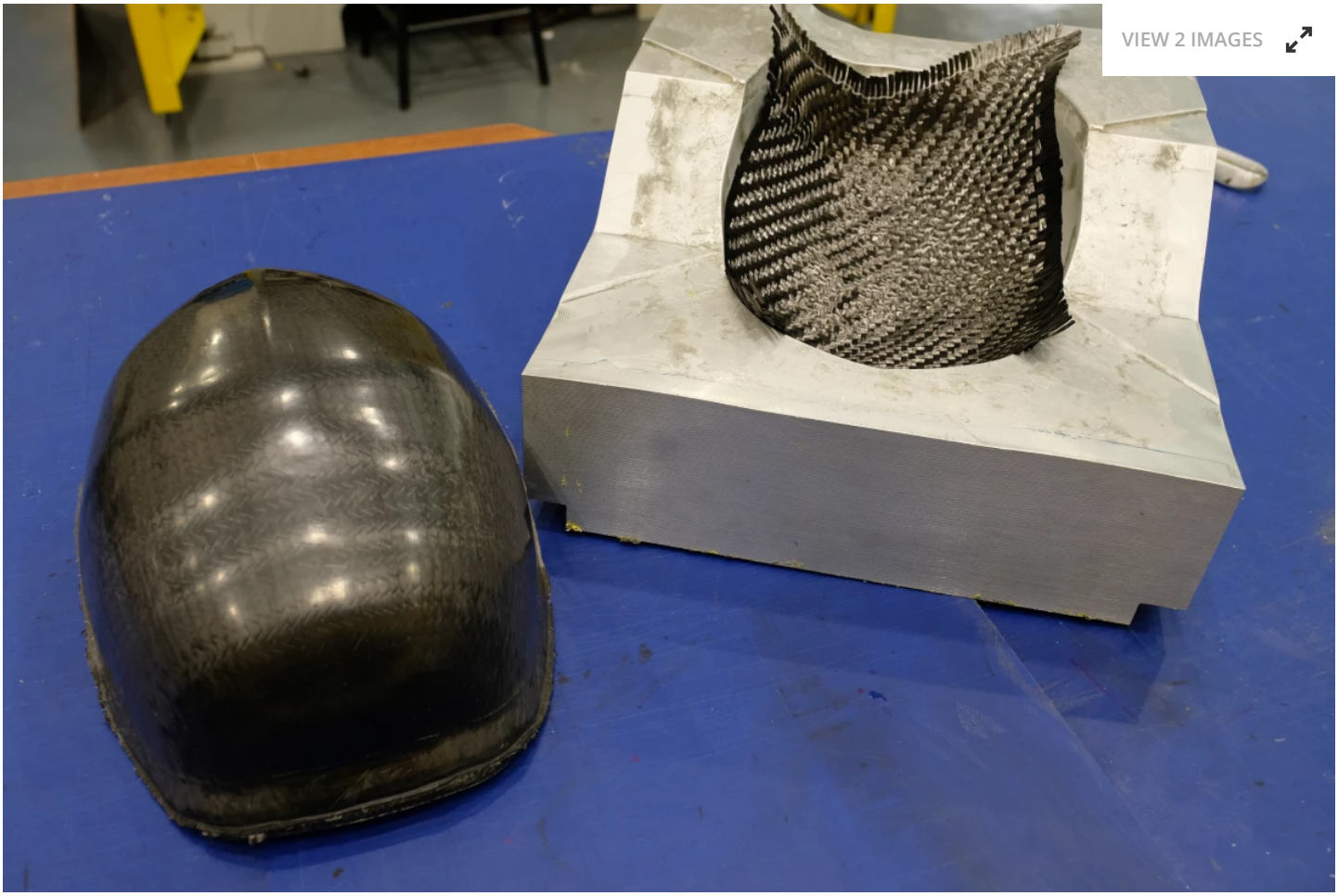

Once commercially available, the helmet should "offer the same protection of current top-tier helmets, but potentially at the price of mid-tier helmets"

Nanyang Technological University

Bike helmets work by absorbing impact energy that would otherwise be passed through to the wearer's head. An experimental new helmet is claimed to do so better than conventional models, thanks to a special resin.

With a few notable exceptions, bicycle helmets typically consist of an outer plastic shell that dissipates impact energy by cracking, along with an underlying expanded polystyrene foam liner that compresses to absorb impact energy, further reducing the amount that reaches the rider's head.

Led by Assoc. Prof. Leong Kah Fai, scientists at Singapore's Nanyang Technological University (NTU) are developing a helmet in which the shell is instead made of carbon fiber impregnated with a thermoplastic resin known as Elium.

Made by French materials company Arkema, Elium gradually hardens into a solid at room temperature, unlike other resins that have to be heated in order to cure. This quality, along with its low viscosity, reportedly allows it to more thoroughly impregnate the carbon fibers, boosting the toughness of the resulting composite.

From left to right: Research associate Goram Gohel, Assoc. Prof. Leong Kah Fai and research fellow Dr. Bhudolia Somen Kumar, with some of their helmets

Nanyang Technological University

According to NTU, the Elium-infused shell of its prototype helmet is tougher, stiffer and less brittle than a traditional polycarbonate shell, allowing it to absorb more impact energy over a longer period of time (in other words, over a larger number of milliseconds per impact).

As a result, lab tests indicate that whereas the foam liner of a polycarbonate-shelled helmet has to absorb about 75 percent of the total impact energy, the liner of the Elium-shelled helmet only has to absorb about 35 percent. Additionally, the composite shell should be cheaper to manufacture than those made of traditional thermoplastics, which have to be molded at high temperatures.

It should be noted that the present prototype helmet is about 20 percent heavier than its conventional counterparts. The researchers hope to address this shortcoming by replacing the carbon fiber with lighter-weight polypropylene fabric.

Source: Nanyang Technological University

TAGS BICYCLES NANYANG TECHNOLOGICAL UNIVERSITY HELMETS THERMOPLASTIC

NO COMMENTS

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Based out of Edmonton, Canada, Ben Coxworth has been writing for New Atlas since 2009 and is presently Managing Editor for North America. An experienced freelance writer, he previously obtained an English BA from the University of Saskatchewan, then spent over 20 years working in various markets as a television reporter, producer and news videographer. Ben is particularly interested in scientific innovation, human-powered transportation, and the marine environment.

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