Syntactic foam sandwich fills hunger for lightweight yet strong materials

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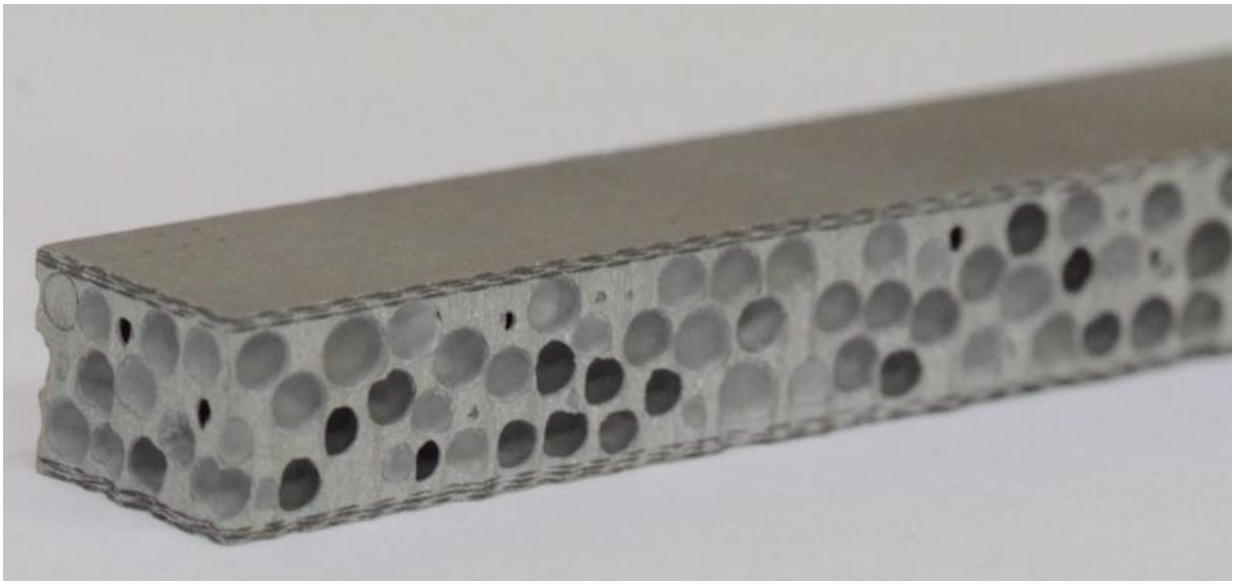


A team of researchers has developed the first composite material that sandwiches a layer of lightweight metal matrix syntactic foam between two carbon fabric layers, offering extreme light weight, flexibility, and the ability to withstand deformation and absorb energy. The material, developed by NYU Polytechnic School of Engineering Nikhil Gupta along with Deep Springs Technology and the U.S. Army Research Laboratory, holds significant potential for automobiles, trains, ships, and other applications requiring lightweight structural components that retain their strength even when bent or compressed. Credit: NYU Polytechnic School of Engineering

A team of researchers reports success in pioneering tests of a layered

material with a lightweight metal matrix syntactic foam core that holds significant potential for automobiles, trains, ships, and other applications requiring lightweight structural components that retain their strength even when bent or compressed.

The research team of Nikhil Gupta, a NYU School of Engineering associate professor in the Department of Mechanical and Aerospace Engineering, working with the Toledo, Ohio, company Deep Springs Technology and the U.S. Army Research Laboratory, published their findings in *Materials Science and Engineering: A*.

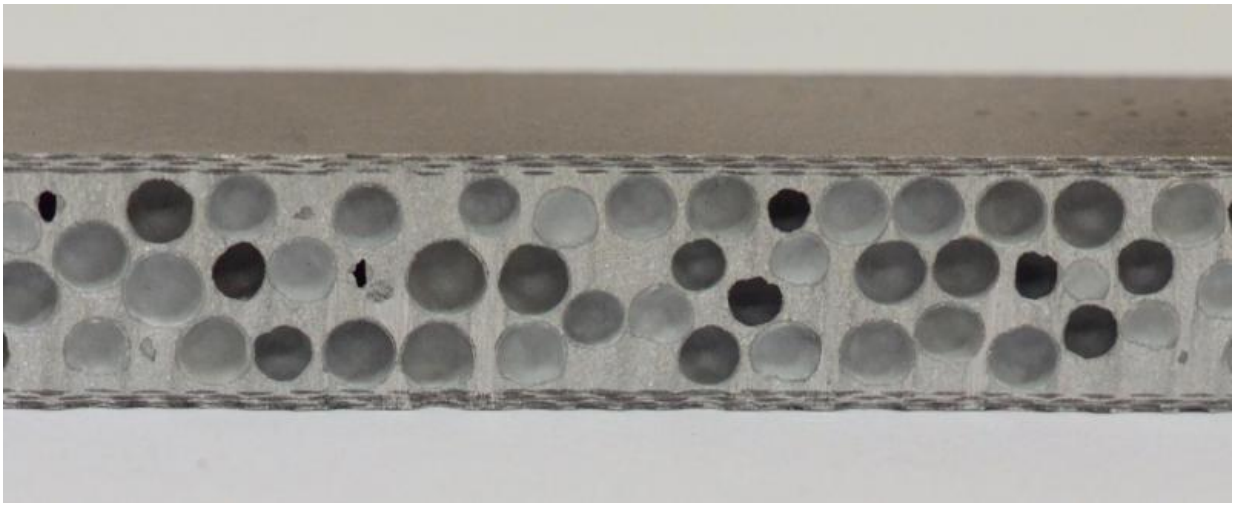
Conventional metal foams have gas-filled pores within the metal, which reduce weight but pose some drawbacks, such as difficulty in controlling the size and shape of the pores during manufacturing.

By contrast, metal matrix syntactic foams incorporate porosity in their foam-like structure by means of hollow particles. In recent years there has been an upsurge in the use of these materials, mainly because of their compressive strength. However, bending strength was a limitation for many potential applications, notably automotive structures.

Metallic foams previously have been sandwiched between two stiff sheets, which provide increased flexural strength while the foam core allows the material to withstand large deformation and absorb energy. But Gupta and his colleagues are the first to develop a metal matrix syntactic foam core sandwich composite.

Their study focused on an aluminum alloy filled with hollow alumina particles sandwiched with carbon fabric face-sheets. The researchers discovered that the resulting layered material reduced weight but also increased stiffness and offered high energy absorption. These qualities make the metal matrix syntactic foam sandwich attractive for automotive floor board panels and other applications in which bending

properties are important.



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"This work could result in a new generation of ships and ground vehicles for both the military and civilian sectors," says Gupta. "Trains can also benefit from the lightweight and high energy absorbing panels made possible by the new sandwich composite."

More information: The paper "Syntactic Foam Core Metal Matrix Sandwich Composite: Compressive Properties and Strain Rate Effects"

reporting these findings is available at www.sciencedirect.com/science/… ii/S0921509315301854

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