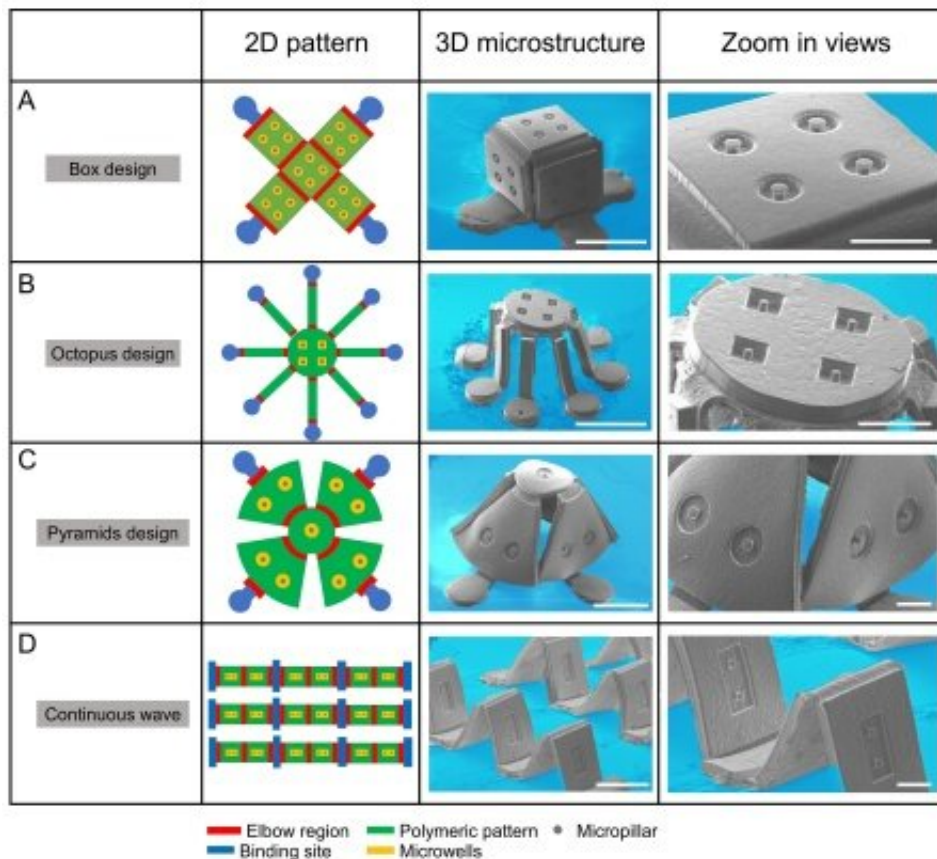


# A new method inspired by kid's pop-up books for making 3D artificial tissue

October 15 2021, by Cory Nealon



The method is based upon compressive buckling – the structural engineering principle that explains why figures project outward from the pages of children’s pop-up books. Credit: University at Buffalo.

University at Buffalo researchers have developed a new process for creating three-dimensional artificial tissue, an advancement that could

improve experimental drug testing, the quality of artificial organs and more.

Described in *Advanced Science*, the method is based upon compressive buckling—the structural engineering principle that explains why figures project outward from the pages of children's pop-up books.

"When you turn to a new page, you create force. This force pulls on the feet of the figure, which forces the folds to open and the figure to pop out," says the study's co-corresponding author Ruogang Zhao, Ph.D., associate professor of biomedical engineering. "With this study, we have shown the same principle can be applied to artificially engineered [tissue](#) ."

In a series of experiments, researchers used the compressive buckling method to fabricate a variety of three-dimensional polymeric structures. These include simple shapes, such as a box and a pyramid, as well as more complex demonstrations, such as a [sound wave](#) and an eight-legged design that resembles an octopus.

To showcase the method's utility for tissue engineering, the team created an osteon-like structure. Osteon is the basic building unit of bone tissue and is characterized by osteocytes sparsely distributed in a mineral bone scaffold. Each osteocyte rests in a small cavity, known as lacunae, and different osteocytes are connected through canaliculi, which are small channels in the bone scaffold.

The results are important, Zhao says, because most tissue engineers rely on two-dimensional tissue fabrication methods to create very thin tissues that do not represent the volume of the human tissue. The planar nature of these tissue models limits their application in disease modeling and drug testing, he says.

The compressive buckling method can be used to rapidly transform a two-dimensional tissue to a three-dimensional tissue with substantial thickness, thus allowing researchers to create more realistic tissue and opening new possibilities in tissue engineering and regenerative medicine. It also has the potential to outperform other method of 3D [tissue engineering](#), such as 3D bioprinting, in terms of the fabrication speed and spatial resolution, Zhao says.

**More information:** Zhaowei Chen et al, Compressive Buckling Fabrication of 3D Cell-Laden Microstructures, *Advanced Science* (2021). [DOI: 10.1002/advs.202101027](https://doi.org/10.1002/advs.202101027)

Provided by University at Buffalo

Citation: A new method inspired by kid's pop-up books for making 3D artificial tissue (2021, October 15) retrieved 25 April 2024 from <https://phys.org/news/2021-10-method-kid-pop-up-3d-artificial.html>

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