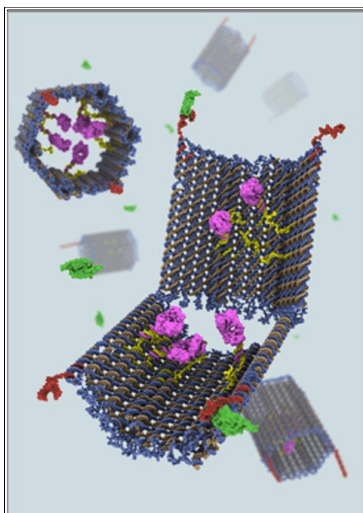


# Is 4-D Printing the Next Big Thing in Medical Technology?

Posted in [Printing Equipment and Supplies](#) by Thomas Klein on February 28, 2014



4-D printed Nano robot;  
Source: Wyss Institute

Most people are still marveling at the wondrous 3-D printing technology and the myriad innovations it may enable, but some scientists have already moved on to exploring a new frontier. In fact, 4-D printing is on the horizon, and researchers are already working on mind-blowing applications for medical technology.

The fourth dimension in 4-D printing is time. Instead of using static materials for 3-D printing like plastic, the new technology deploys adaptive composite material that change their shape and properties over time or when exposed to certain stimuli. If the temperature changes or materials come into contact with water, for example, the 3-D printed objects assume a new, preprogrammed form. The term 4-D printing was coined by Skylar Tibbits of Massachusetts Institute of Technology's Selfassembly Lab.

Although the technology is still at a very early stage, there are already projects searching for applications in medical technology. Researchers at [Nottingham Trent University](#) built a 3-D printed device that can be customized to patients with heart failure. The balloon-like implant consists of silicone that expands when exposed to electricity. By expanding and contracting, the device supports the heart to circulate blood.

Scientists from the [Wyss Institute](#) at Harvard University are working on a different one on the nanoscale utilizing a similar principle. [Shawn Douglas](#) and his team use the 3D construction software of the company Autodesk to create nanorobots out of proteins for targeted drug delivery. In a process the company called DNA "Origami", they print a structure resembling a clamshell basket. The structure functions as transport vehicles for antibodies. Once it gets into contact with cancer cells, it changes its structure, thereby releasing the medicine. "The

basic idea was to make a cage or basket that protects a fragile, toxic or precious payload and only release it at the right moment," said George Church from the Wyss Institute.

-- By [Thomas Klein](#), Managing Editor, EMDT  
[thomas.klein@ubm.com](mailto:thomas.klein@ubm.com)