Rapid 3D printing method moves toward 3D-printed organs

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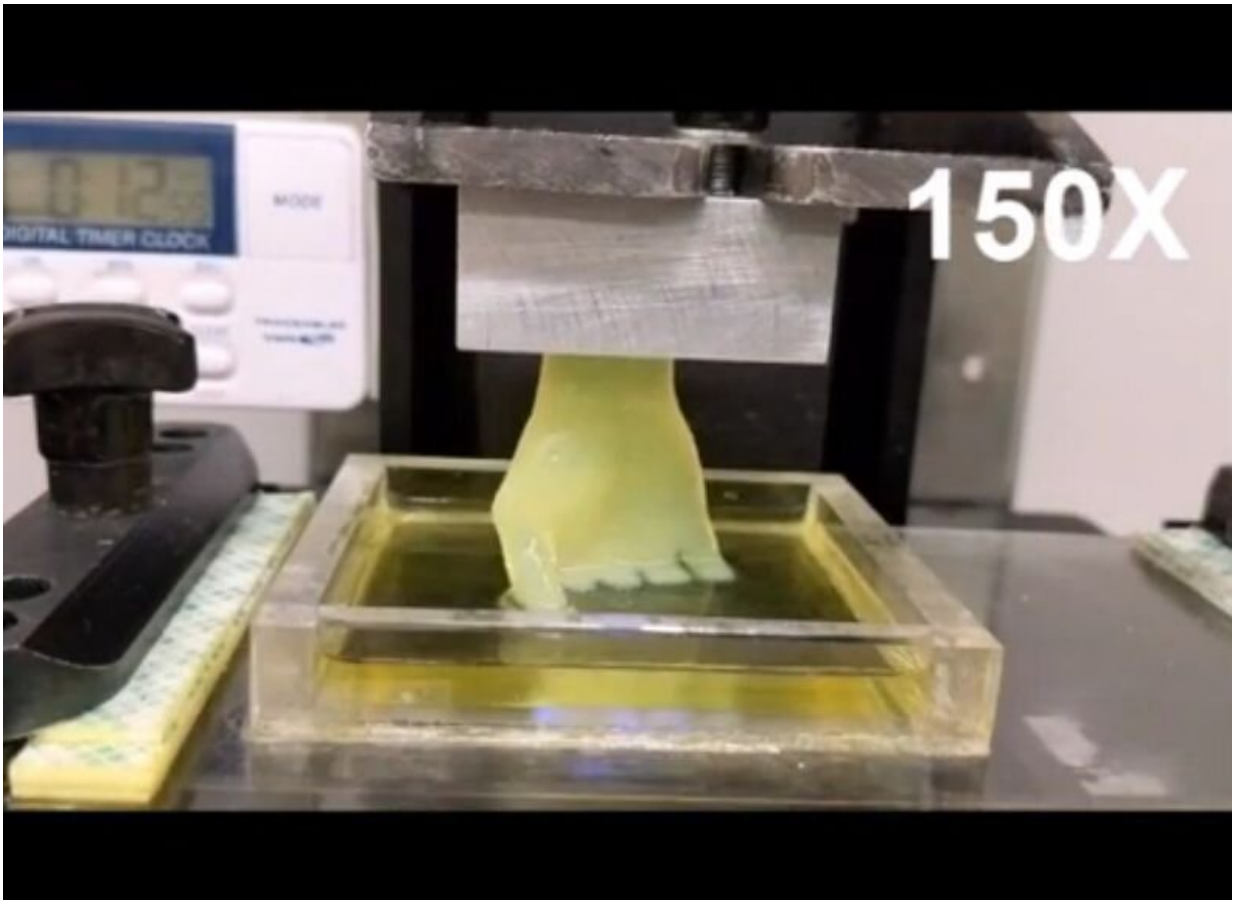

It looks like science fiction: A machine dips into a shallow vat of translucent yellow goo and pulls out what becomes a life-sized hand.

But the seven-second video, which is sped-up from 19 minutes, is real.

The hand, which would take six hours to create using conventional 3-D printing methods, demonstrates what University at Buffalo engineers say is progress toward 3-D-printed human tissue and organs—biotechnology that could eventually save countless lives lost due to the shortage of donor organs.

"The technology we've developed is 10-50 times faster than the industry standard, and it works with large sample sizes that have been very difficult to achieve previously," says the study's co-lead author Ruogang Zhao, Ph.D., associate professor of biomedical engineering.

The work is described in a study published Feb. 15 in the journal *Advanced Healthcare Materials*.

It centers on a 3-D printing method called stereolithography and jelly-like materials known as hydrogels, which are used to create, among things, diapers, contact lenses and scaffolds in tissue engineering.

The latter application is particularly useful in 3-D printing, and it's something the research team spent a major part of its effort optimizing to achieve its incredibly fast and accurate 3-D printing technique.

"Our method allows for the rapid printing of centimeter-sized hydrogel models. It significantly reduces part deformation and cellular injuries caused by the prolonged exposure to the environmental stresses you commonly see in conventional 3-D printing methods," says the study's other co-lead author, Chi Zhou, Ph.D., associate professor of industrial and systems engineering.

Researchers say the method is particularly suitable for printing cells with embedded blood vessel networks, a nascent technology expected to be a

central part of the production of 3-D-printed human tissue and organs.

More information: Nanditha Anandakrishnan et al, Fast Stereolithography Printing of Large-Scale Biocompatible Hydrogel Models, *Advanced Healthcare Materials* (2021). DOI: 10.1002/adhm.202002103

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