Creating artificially engineered organs could become quicker and easier with 3D bioprinting

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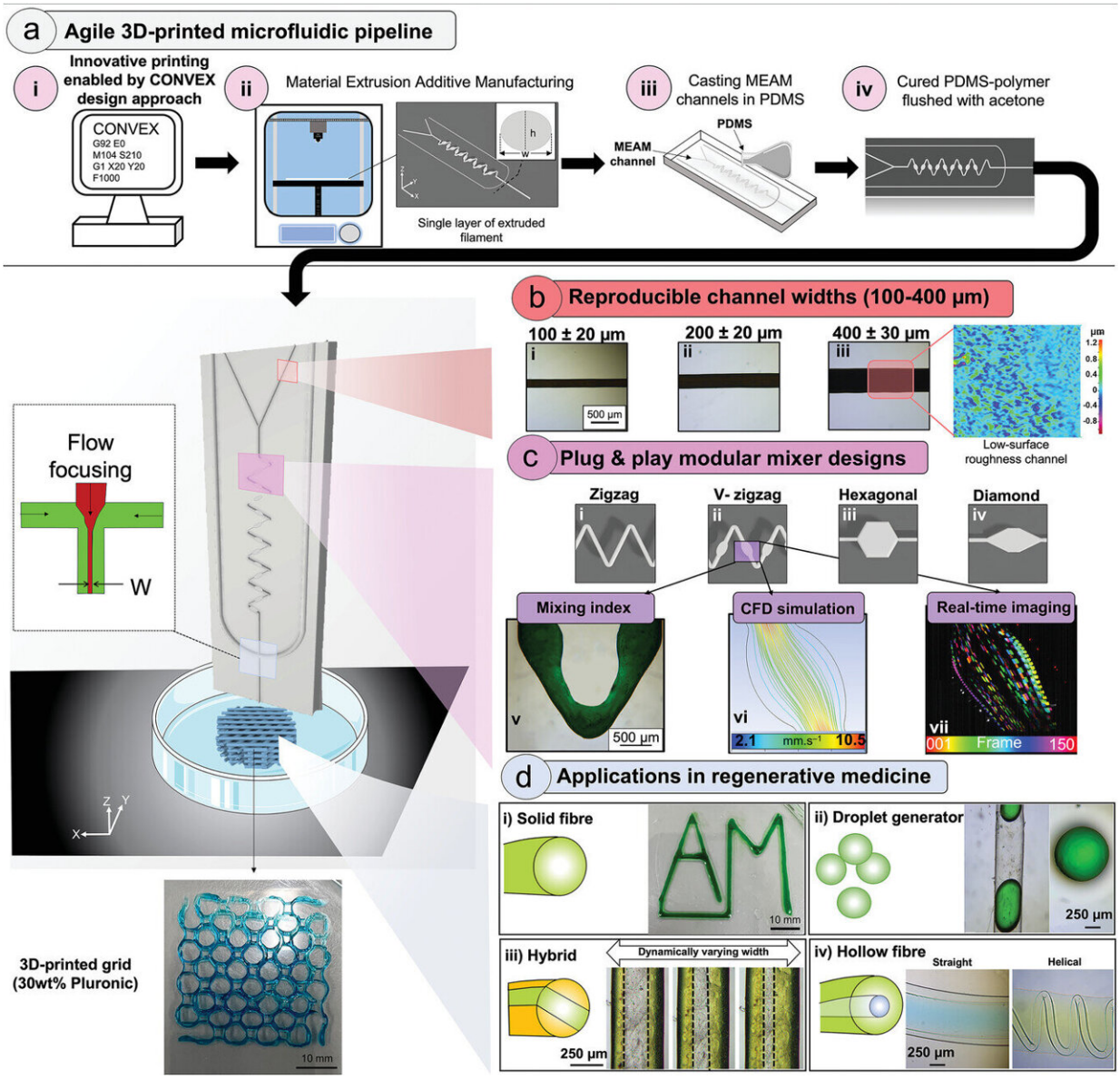

An overview of the new manufacturing pipeline to produce MEAM-enabled microfluidic devices. Credit: *Advanced Healthcare Materials* (2023). DOI: 10.1002/adhm.202300636

The University of Huddersfield is part of a 3D bioprinting research project that could reduce the cost and speed up the creation of tissue-compatible artificially engineered organs with the potential to save thousands of lives.

The 3D bioprinting process has been used for this purpose for many years but has so far failed to match body tissue—leaving patients awaiting natural organ transplants, dependent on immunosuppressants, and prone to infection as well as increased risk of cancer.

Creating microfluidic tissue overcomes this issue, but is currently expensive and labor-intensive to manufacture. Dr. Amirpasha Moetazedian from the University's School of Computing and Engineering has been working alongside partners from the University of Birmingham and Polytechnic University of Milan to develop an agile manufacturing pipeline that could cut costs and simplify the production process, making the wider adoption of microfluidics more likely.

Dr. Moetazedian, a Lecturer in Medical Engineering in the Department of Engineering and Technology, explained that if they can produce the devices at a fraction of the cost, it will open up an array of new opportunities.

"Producing complex microfluidic devices at a fraction of the cost would open up new opportunities in a wide range of applications from tissue scaffolds, cell culture systems, body-on-a-chip devices, biochemical

sensors and bio-catalysis," he said.

Associate Professor in Biomaterials and Biomanufacturing Gowsihan Poologasundarampillai, from the University of Birmingham, said that organ transplantation has saved many lives and millions of pounds for the UK's National Health System, but every day, four people in the UK are still dying while on the waiting list.

"There is a dire need for artificially engineered organs and tissue grafts that take successfully without the need for immunosuppression," he said. "Our breakthrough will help to speed wider adoption of microfluidic-based 3D bioprinting for fabrication of blood vessels, tissues and organs, saving lives across the UK and beyond."

The new manufacturing pipeline combines additive manufacturing with innovative design approaches to simplify and advance high-value manufacturing, while reducing the production cost by few folds.

"Advantages of our technology include rapid integration of modular microfluidic components such as mixers and flow-focusing capability, highlighting the flexibility and versatility of our approach," added Professor Poologasundarampillai.

The findings are published in the journal *Advanced Healthcare Materials*.

More information: Amirpasha Moetazedian et al, Versatile Microfluidics for Biofabrication Platforms Enabled by an Agile and Inexpensive Fabrication Pipeline, *Advanced Healthcare Materials* (2023). DOI: 10.1002/adhm.202300636