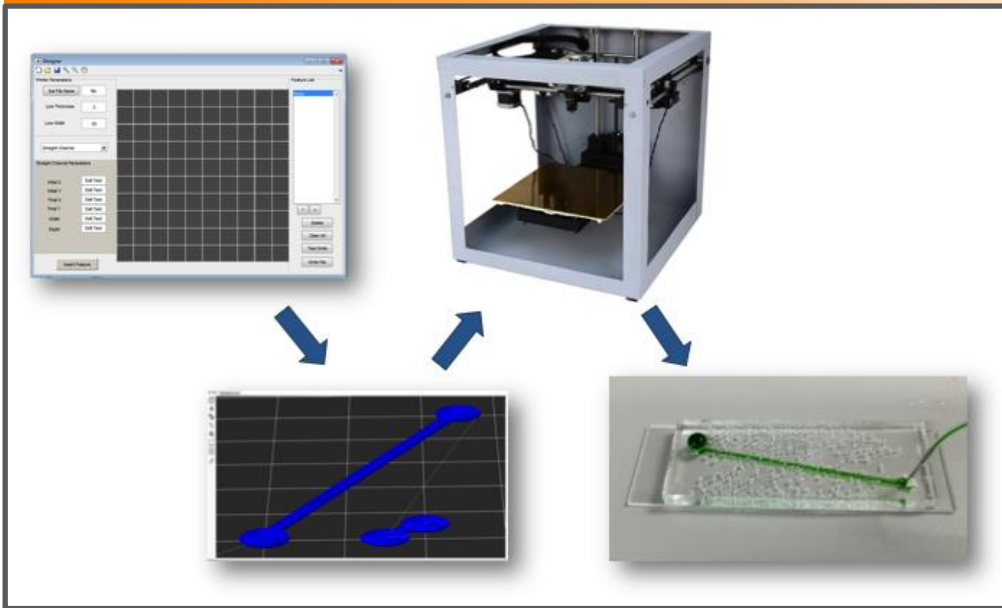


Enabling Low Cost Fabrication and Design of Microfluidic Devices with 3D Printing



Advantages

- Startup costs less than \$1000
- Production costs less than \$1 per device
- No use of dangerous chemicals
- Feature based software reduces design time

Potential Applications

- Research groups to quickly iterate through designs
- DIY bio enthusiasts looking for an inexpensive and safe way to use microfluidics
- Education, Introducing students to microfluidics

Point of Contact

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- The Bredesen Center, UT
- The Center for Nanophase Material Sciences, ORNL
- Biosciences Division, ORNL

Technology Summary

Microfluidics enable scientists and doctors to interface biological systems and better understand complex environments. Microfluidics are commonly used in biological and biomedical research, however, the use of microfluidics is held back by high costs. Microfabrication equipment used in the manufacture of devices costs millions of dollars and requires cleanroom facilities. This leads to devices on the order of hundreds to thousands of dollars. Researchers here at ORNL have developed software that uses consumer grade 3D printers to fabricate devices for less than a dollar each.

The software developed here will allow a user to combine common microfluidic features into a custom device. From there, a mold of the device is written on a 3D printer, and common microfluidic casting techniques are used to produce a device. The entire process can be done on a counter top at a cost of less than \$1 per device.

These low-cost devices can be used in current applications of research and diagnostics in a limited range of applications due to boundaries in 3D printer resolution. Another potential market for this technology is for education, which is largely underdeveloped due to the high cost previously mentioned. The low cost of this technology makes it a prime candidate for developing this market and giving students access to cutting-edge technology that is changing the way biomedical research is done.