3D Printable Multifunctional Fibers

VTIP 20-053: "Micro-extrusion and 3D Printing of Multifunctional Fibers"

THE CHALLENGE

3D printing has enabled the customized production of many objects and devices, but that technology currently only creates passive units.

OUR SOLUTION

Researchers at Virginia Tech have developed a coaxial microextrusion technique that enables us to take advantage of triboelectric energy generation and custom build sensors to fit anywhere. This ability to print devices that can generate triboelectric energy can eliminate the need to recharge or replace batteries in small personal electronics like heart rate monitors, pedometers, or calculators.

3D printing of multifunctional fibers can also create sensors with a wide variety of applications. One prototype built in the lab was able to measure changes in kidney blood flow. Another prototype, a sensor printed onto a mask, holds great promise for those who have lost their ability to speak or those who may wish to communicate silently.



Design schematic for coaxial micro-extrusion head.



Multifunctional fibers can be printed into almost any shape; these are some examples of shapes that were experimented with in the lab.



Example of a functional prototype built using microextrusion technology–a triboelectric fiber-based device to sense blood flow.





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