

# 3D Printing: Novel Print Head for Multiscale Fabrication

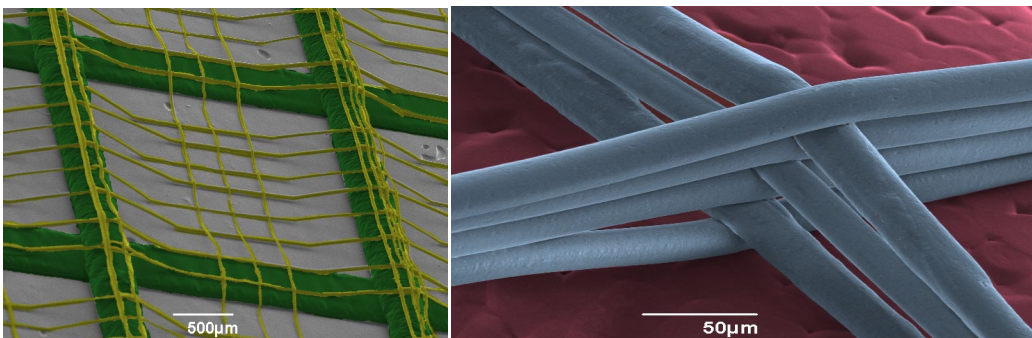
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## CHALLENGE

Fused Filament Fabrication (FFF) is a well established 3D printing technique for thermoplastic polymers. It is the method of choice for the additive manufacturing of large scale structures offering a resolution down to a few hundred micrometers.<sup>1</sup> However, there are applications such as scaffolds for tissue engineering or electrodes for electrocatalysis requiring smaller, yet precisely defined architectures in combination with larger load bearing structures. Melt Electrowriting (MEW) is an emerging 3D printing technique for the fabrication of microfibrous structures.<sup>2</sup> To date there is no process to combine FFF and MEW though, besides using two different 3D printing devices one after the other. This is not only time consuming and hence economically ineffective, but also imposes additional contamination risks when transferring the product from one machine to the other.

## INNOVATION

This invention provides a technical modification in the form of a novel print head to upgrade existing FFF systems to additionally perform MEW. As such, the established FFF technology ecosystem can be exploited for MEW processes and users can stay within present workflows with minimal modifications. Furthermore, hybridizing the two AM techniques (FFF + MEW) allows to fabricate multiscale constructs with design features that span from single-digit microfibers fabricated via MEW to macro-elements produced via FFF in a single process.



## COMMERCIAL OPPORTUNITIES

The invention is relevant to polymer 3D printing of multiscale structures.

## DEVELOPMENT STATUS

The invention was tested in first experiments.

## REFERENCES:

- <https://doi.org/10.1016/j.addma.2021.102378>
- <https://onlinelibrary.wiley.com/doi/10.1002/adfm.201904664>



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