

Postdoctoral Position - 3D-printing in the Micro and Nanoscale

We are looking for an early career researcher (less than 5 years post PhD award) to conduct research in the field of 3D-printing in the micro and nanoscale.

This project aims to develop an electrohydrodynamic (EHD) printing platform for printing micro- and nanostructures, functional nanofibers, nanofiber mesh, etc. Applications for 3D micro- and nanostructures include electronic devices, sensors, and semiconductors. Functional nanofibers have biomedical applications in wound dressing and tissue engineering scaffolds. Nanofiber mesh is used in nanoparticles filtration. Examples of printed scaffolds are shown in Figure 1.

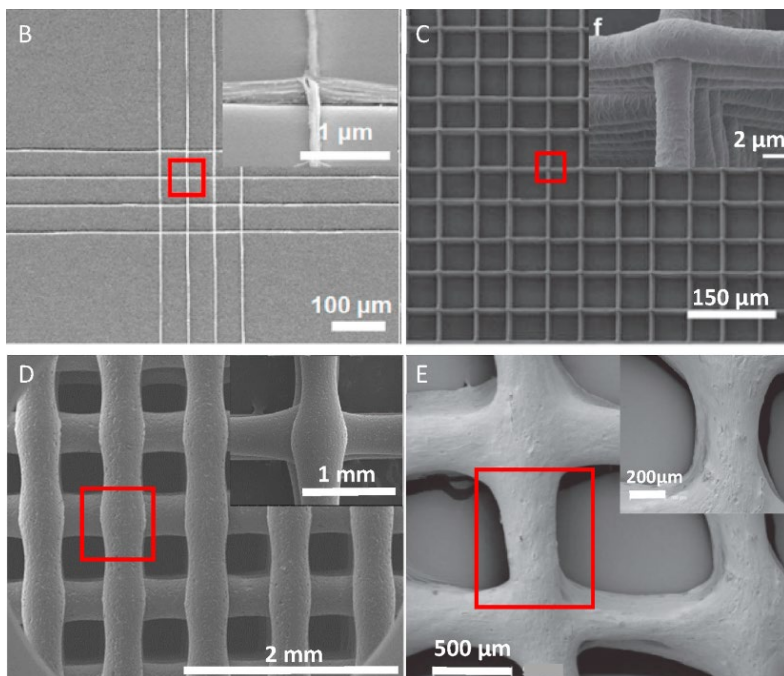


Figure 1: Scaffold printed with different techniques. 3D scaffolds mimic microstructures of tissues [1].

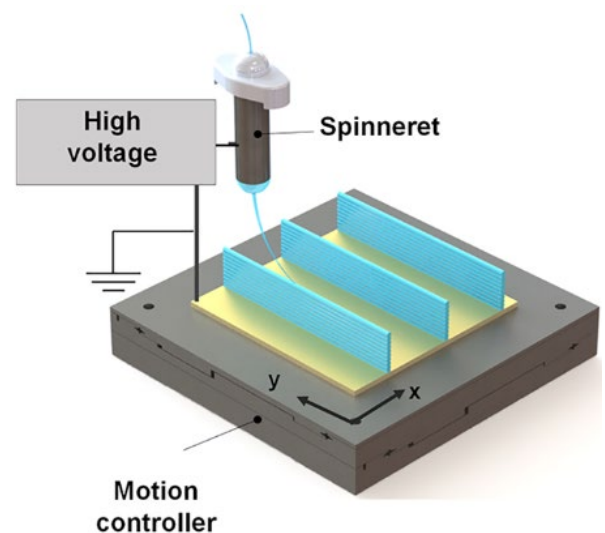


Figure 2: A 3D-printing system [2].

The electrohydrodynamic printing platform will consist of a spinneret that used to extrude a solution for printing, and a precision motion stage with nanoscale resolution (see Figure 2). This project will focus on several key research challenges in devising this platform, including mechanical design and advanced control of the 3D-printing system, computational fluid dynamic analysis of the EHD process, synthesis of precursors and solutions suitable for EHD printing, and experimental testing. The printed micro/nano structures will be characterized and tested for applications.

References

- [1] P.S. Zielinski. Et al., 3D printing of bio-instructive materials: Toward directing the cell, *Bioactive Materials*, 19 (2023) 292–327, <https://doi-org.ezproxy.newcastle.edu.au/10.1016/j.bioactmat.2022.04.008>
- [2] Y.-S. Park, et al., Near-field electrospinning for three-dimensional stacked nanoarchitectures with high aspect ratios, *Nano Lett.* 20 (1) (2020) 441–448, <https://doi.org/10.1021/acs.nanolett.9b04162>.

Who Are We?

Precision Mechatronics Lab is a multidisciplinary research team at the University of Newcastle, Australia. The team consists of electrical engineers, mechanical engineers, and physicists. We develop new mechatronic systems and robotic technologies for a wide range of applications. Our research includes fabrication, imaging, MEMS, soft robotics and medical devices. The supervisory team has an extensive knowledge in electrospinning, MEMS, mechanical design of precision systems, advanced control of nanopositioners, advanced imaging techniques, electrohydrodynamic analysis, and atomic force microscopy.

Successful candidates will have access to the state-of-the-art facility at the Precision Mechatronics Lab. Equipment includes Scanning Electron Microscope, high-voltage amplifiers, high-precision nanopositioning systems, laser vibrometers, wire bonding machines, Atomic Force Microscopes, and active vibration isolation tables.

Visit <https://www.precisionmechatronicslab.com/> to find out more.

Who We Are Looking For?

We are looking for exceptional postdoctoral researchers with a background in Electrical and Electronics / Mechatronics / Mechanical Engineering or Physics. We want diverse and creative scholars who are excited about being part of our vibrant research team.

Candidates with the following skills and background knowledge are encouraged to apply:

- A demonstrated capability in electrohydrodynamic printing or electrospinning.
- A demonstrated capability in synthesising precursors and solutions for EHD printing.
- Have experience in Computational Fluid Dynamic analysis in ANSYS or other software (desirable criteria).
- A demonstrated capability in mechanical design and control (desirable criteria).
- Be able to demonstrate academic and research excellence.
- Have a high level of written and oral communication skills.
- Have demonstrated carrying out research projects individually or in teams.

What We Offer

This position will be offered as a one-year level A, fixed-term position, with an option to extend to another year.

The remuneration is from AUD\$90,000 - AUD\$110,000 per year.

How to Apply

Contact me (yuenkuan.yong@newcastle.edu.au) to discuss the project and position.

Closing date

Until the position is filled.