



**University
of Victoria**



**Laboratory for
Innovations in
Microengineering**

Research in Laboratory for Innovations in Microengineering

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Department of Mechanical Engineering, Center for Biomedical Research (CBR), and Centre for Advanced Materials and Related Technology (CAMTEC)

Space



- Biosafety Level 2 facility (mammalian cell culture, bacteria and fungi culture, flow cytometry, Zone of inhibition test, 3D culture, 3D bioprinting, PCR, ...)
- Material characterization (chemical synthesis, rheometer, FTIR, Mass Spectroscopy, tensile machine, non-invasive mechanical tester, NMR,...)
- In-house microfabrication facility (photo-lithography, class 100 and 1000 clean rooms for nanofabrication, etc.)
- Imaging (SEM, AFM, confocal, epifluorescent)
- Mouse model (Infected wounds and subcutaneous material testing, histopathology, etc.)

Team (Established in September 2015)



- 1 Postdocs
- 4 PhD students
- 5 MSc students
- 2 Undergrads
- 32 Alumni

National and international collaborations

- 25 researchers
- 18 universities
- 5 Countries

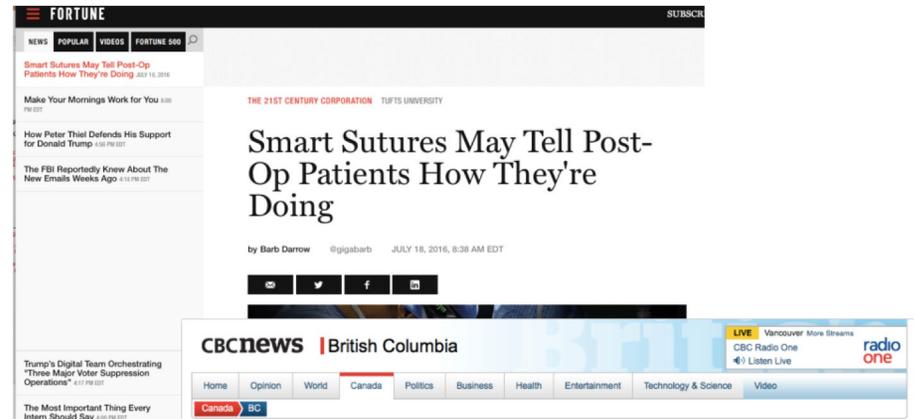
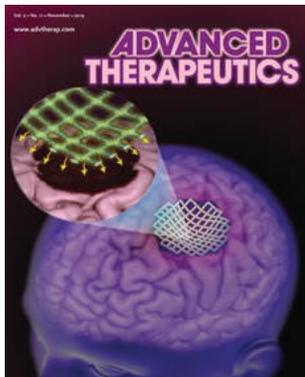
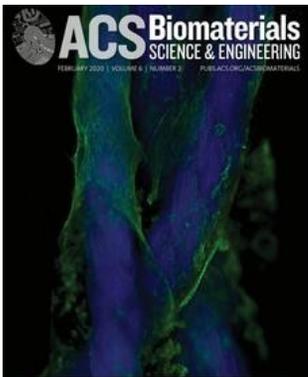
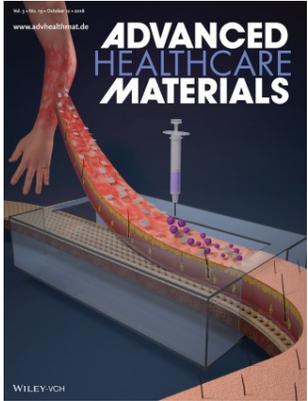
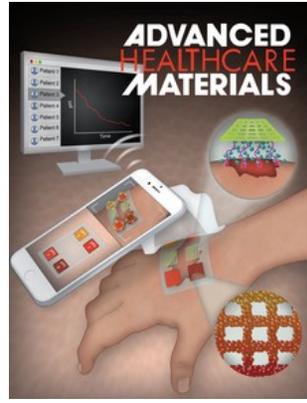
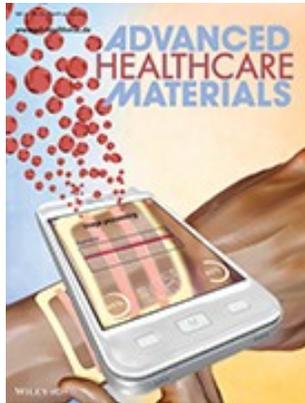
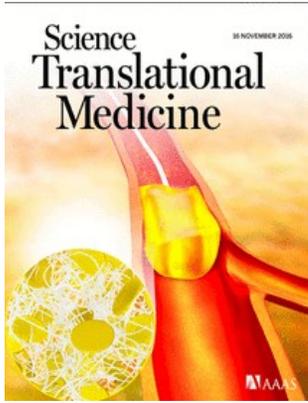


Industrial Partners

8 Industrial partners across Canada



Achievements (Featured in +50 websites)



New smart microfibres target emerging drug therapies for deadly disease

When University of Victoria biomedical engineer Mohsen Akbari gets talking about the futuristic microfibres being created in his lab to solve medical mysteries, it sounds just about as far away from nature as you can get.

But in fact, nature is both inspiration and blueprint for the work of the Laboratory for Innovation in Microengineering (LiME). Researchers at the multi-discipline lab study what nature already does brilliantly, then work to recreate that in the lab to improve how to treat disease and administer drugs.

Research at Laboratory for Innovations
in Microengineering (LiME)

Bioengineered tissues for
disease modelling and drug
studies

Tissue Printing and Organ
Weaving

Organs-on-chip

Cancer Spheroids and
Organoids

Smart Drug Delivery Systems

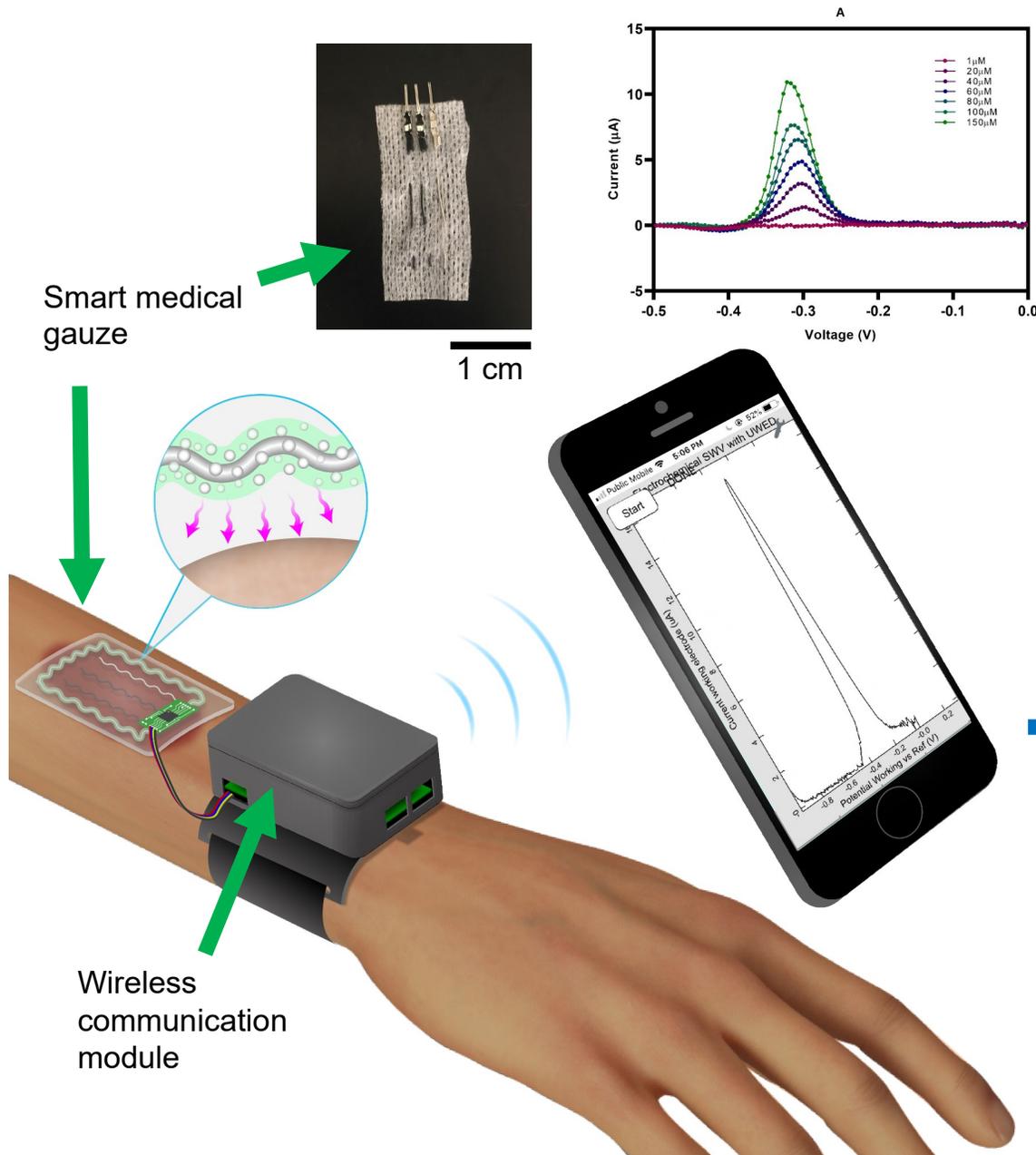
Smart Wound Dressings

Injectable Materials for Cell
and Drug Delivery

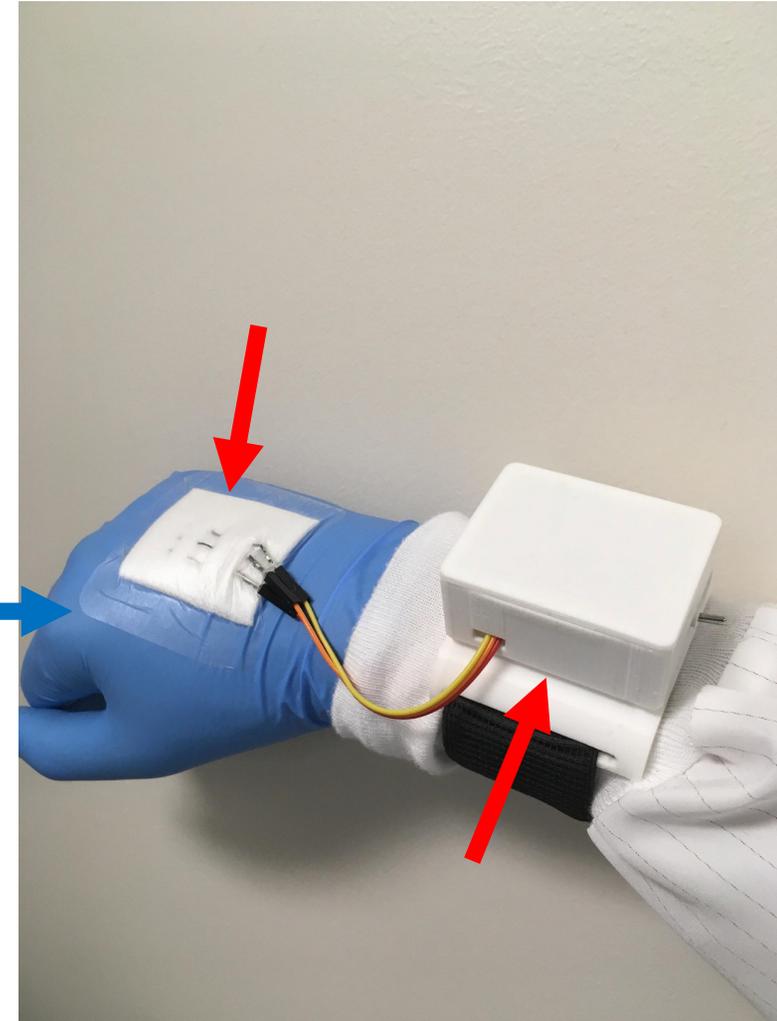
Implantable Mesh for
Management of Brain Tumors

Smart Dressings for Wound Management

Smart medical gauze

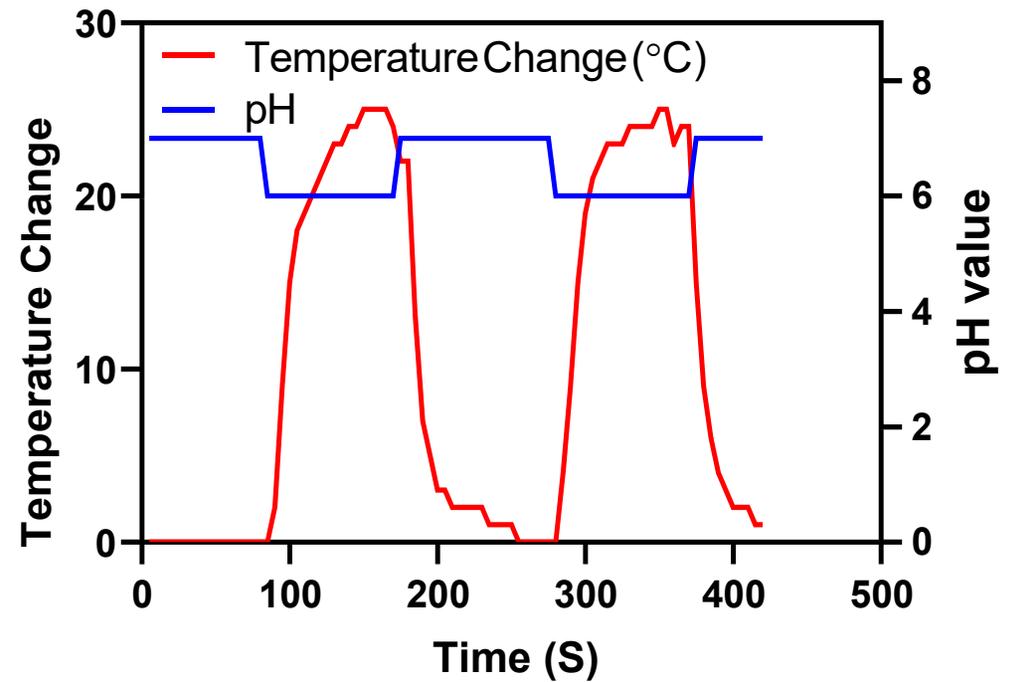


Smart gauze in action

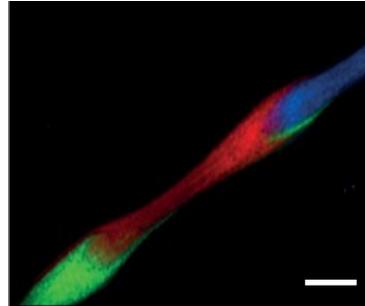
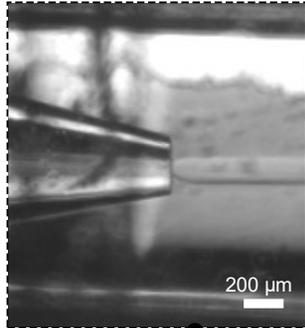


Smart Microfibers

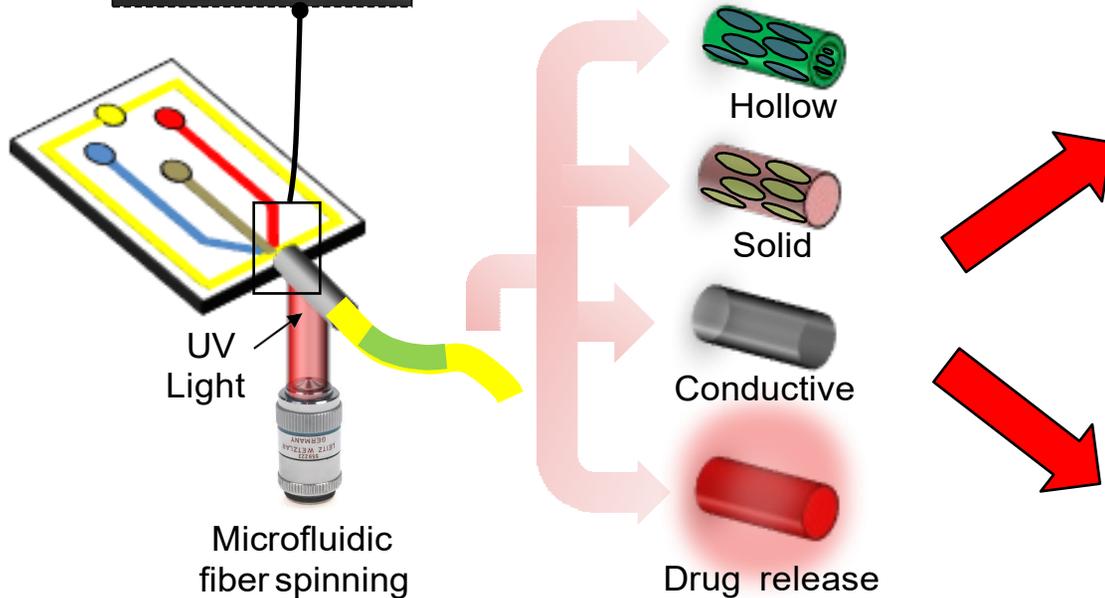
Towards Intelligent Wound Management Systems



Advanced Multifunctional Fibers



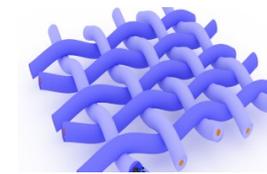
Courtesy: Kang et al.,
Nature Materials,
2011.



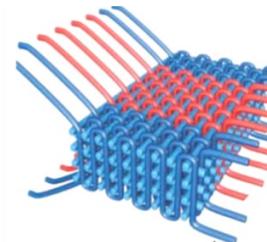
Organ weaving



Braiding (1D)

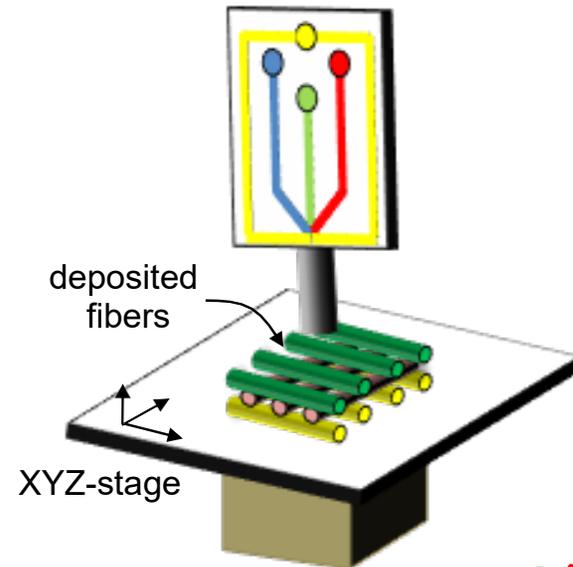


Weaving (2D)



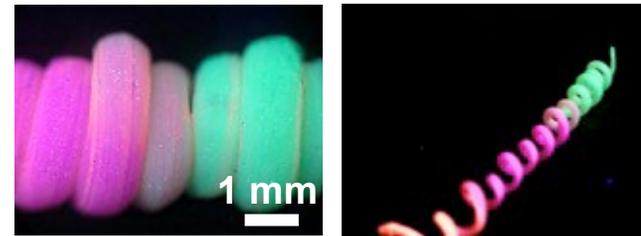
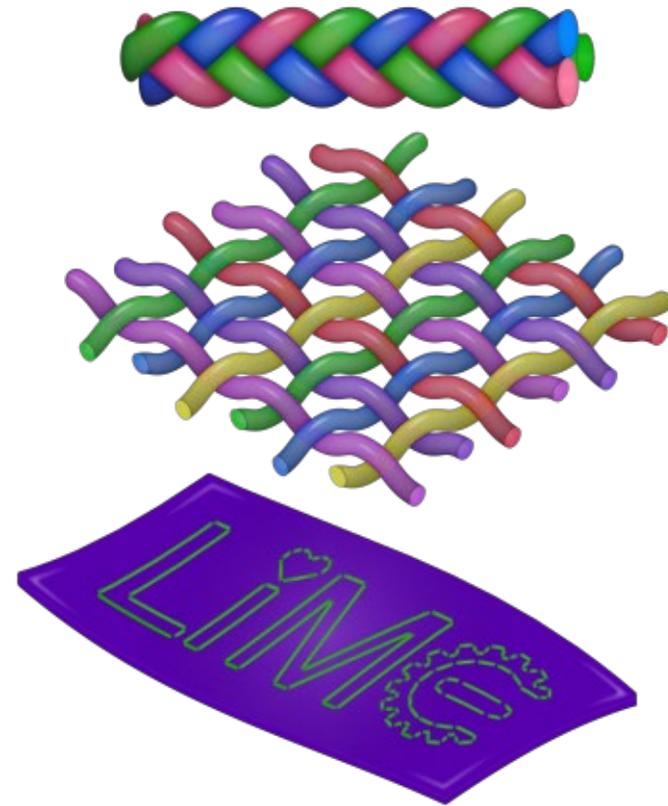
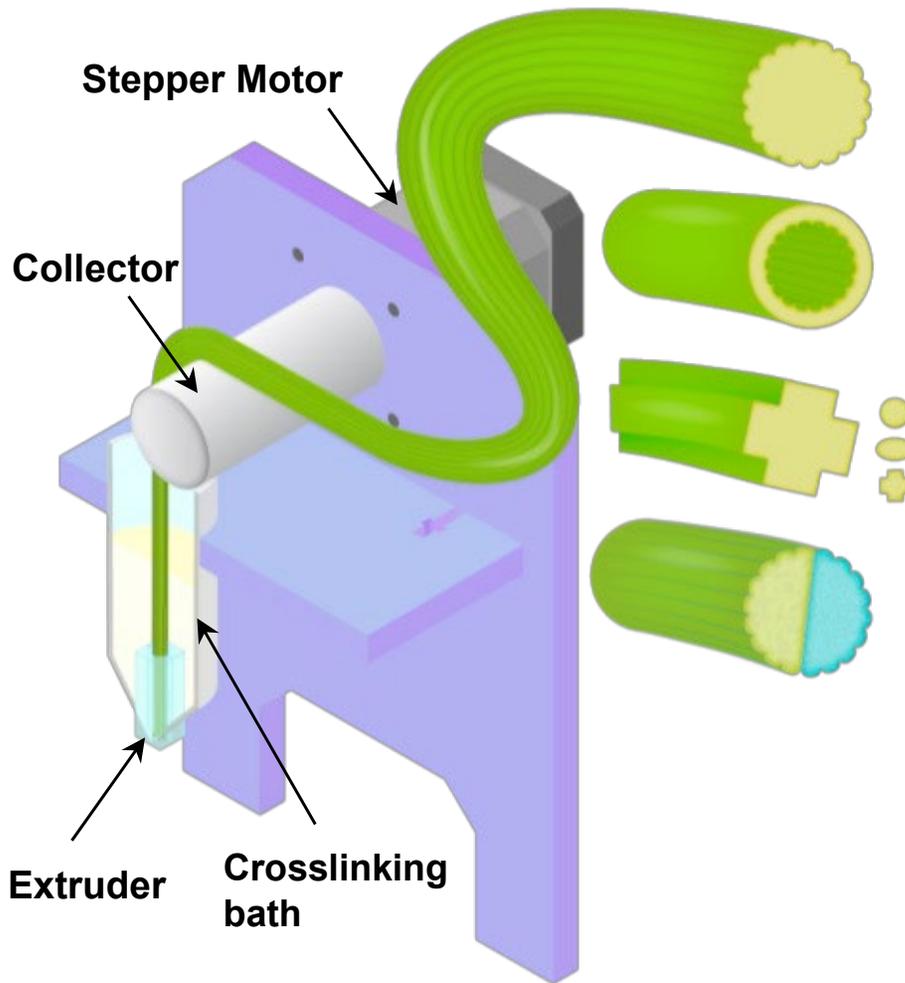
Embroidering (3D)

Organ printing



- Continuous fabrication of microfibers
- Tunable morphological, structural, and chemical features

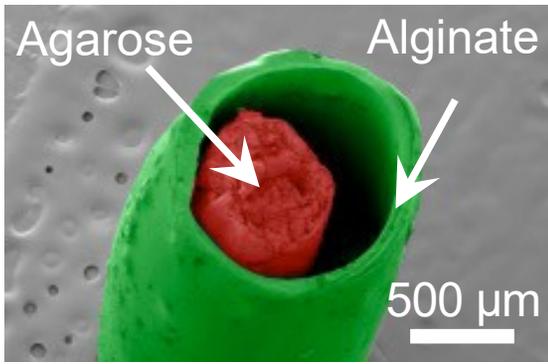
Advanced Multifunctional Microfibers



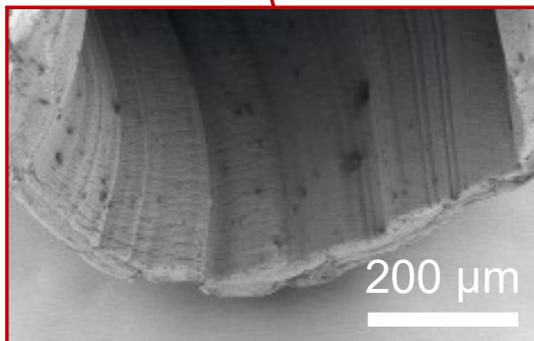
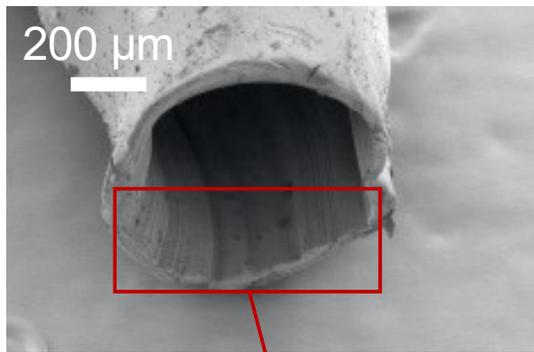
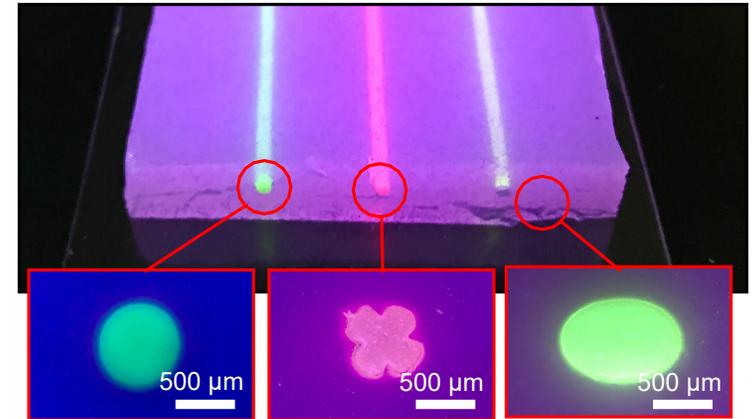
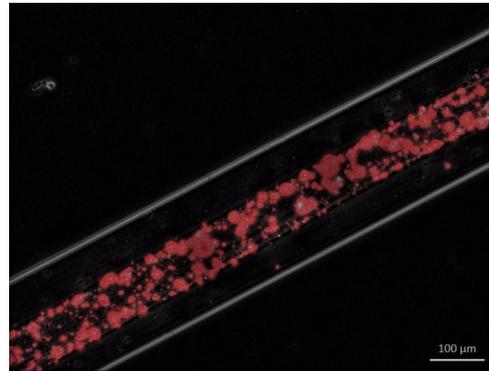
Multi-material fibers

- Meter-long fabrication of multifunctional hydrogel micro fibers
- Flexibility and ability to form irregular shapes
- Ability to control the spatiotemporal properties of the fibers

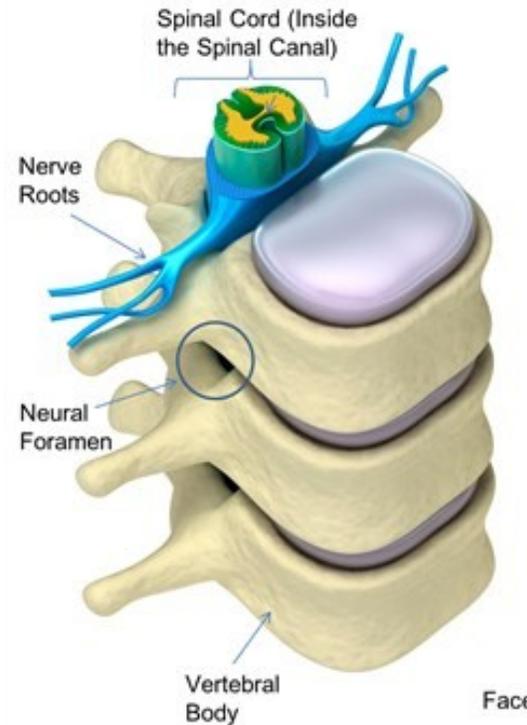
Advanced Multifunctional Microfibers



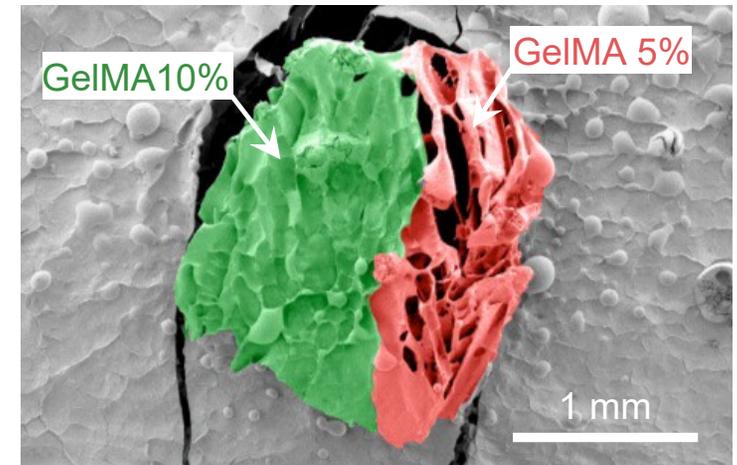
Core-shell fibers



Hollow fibers

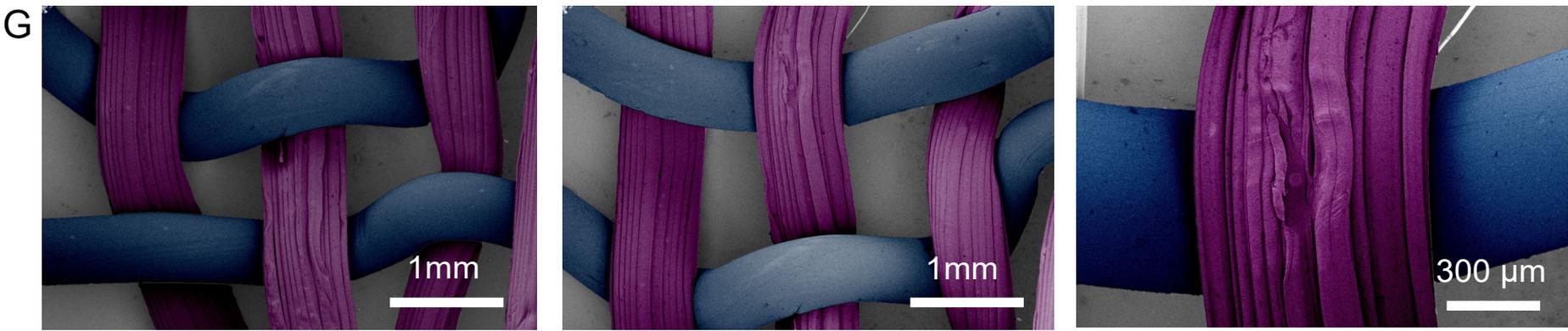
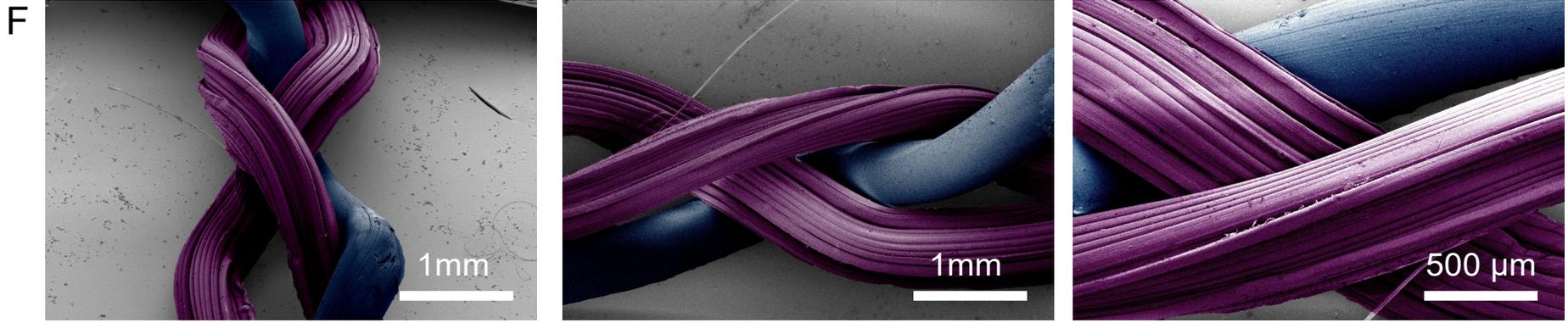
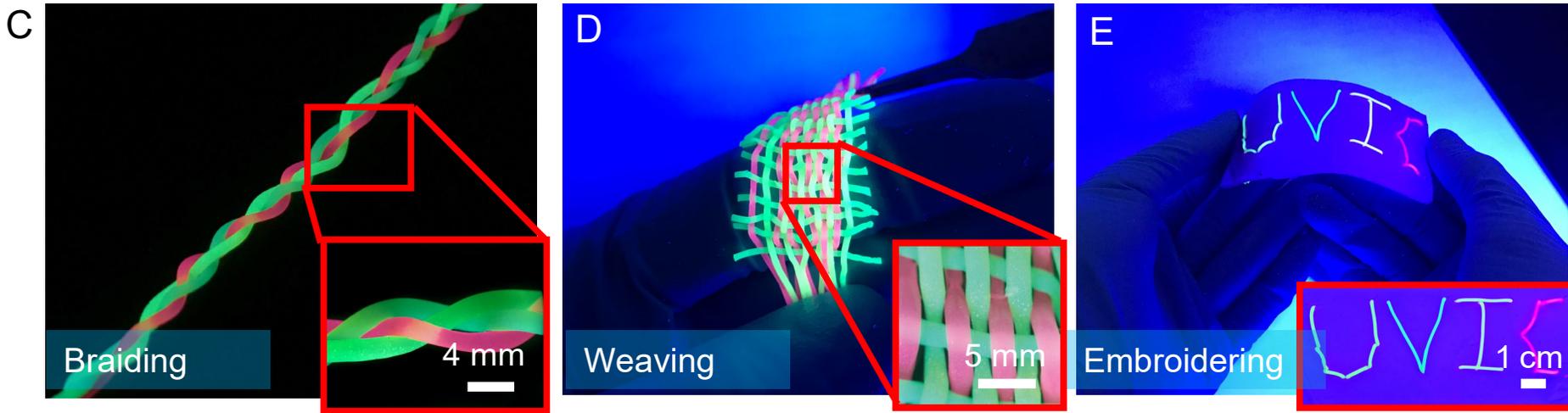


Spinal cord



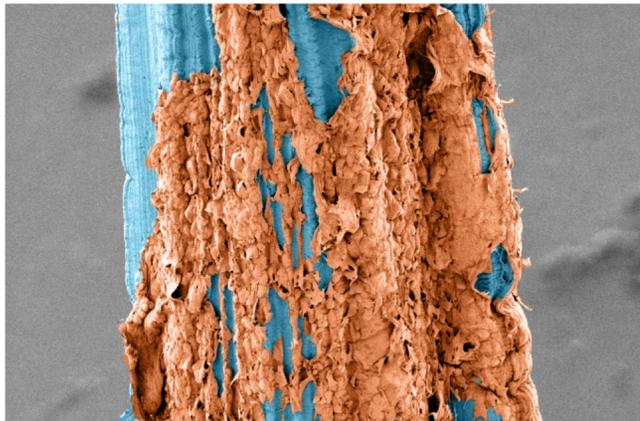
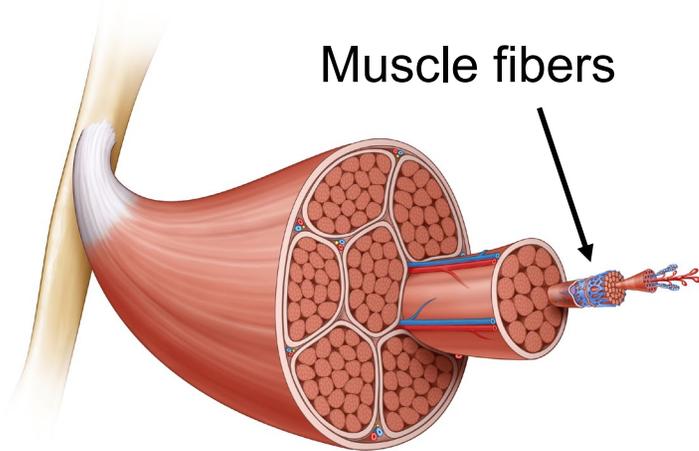
Bi-porous fibers

Advanced Multifunctional Microfibers

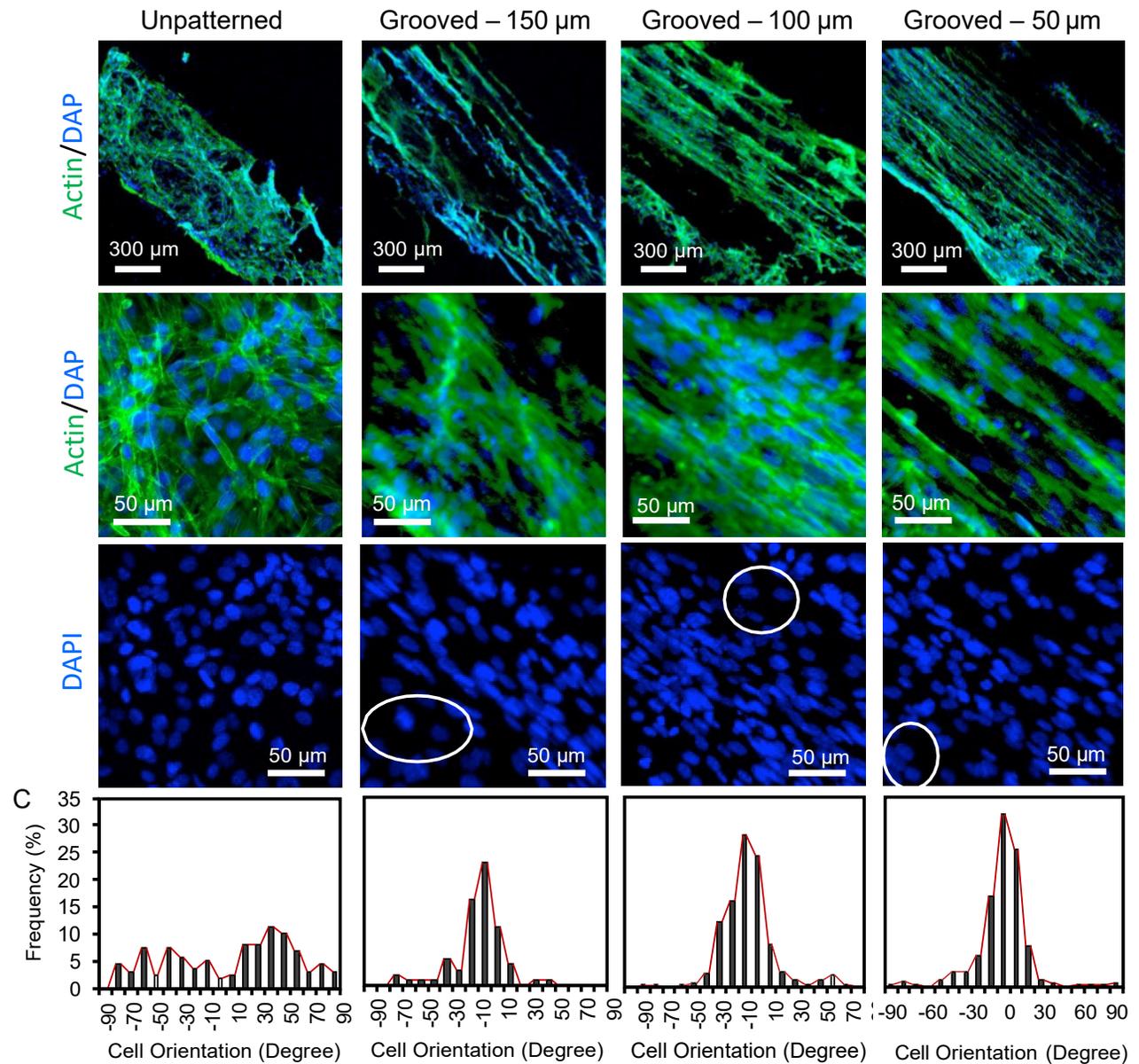


Advanced Multifunctional Microfibers

Towards engineering skeletal muscle



Mouse myoblasts



e-Seminar Series on Translational BME

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e-Seminar Series on Translational Biomedical Engineering

 <p>July 8th, 12:00 pm (ET) Prof. Ali Khademhosseini <i>Director and CEO of Terasaki Institute for Biomedical Innovation (TIBI), Co-founder of Osidio</i></p>	 <p>July 15th, 12:00 pm (ET) Dr. Azadeh Goudarzi <i>CEO and Co-founder of Pomegranation Solutions Inc.</i></p>
 <p>July 22nd, 12:00 pm (ET) Prof. David Juncker <i>Chair of the Department of Biomedical Engineering, McGill University, Co-founder of nplex biosciences Inc.</i></p>	 <p>July 29th, 12:00 pm (ET) Prof. Hadi Shafiee <i>Brigham and Women's Hospital, Harvard Medical School, Co-founder of Vertility LLC.</i></p>
 <p>August 5th, 12:00 pm (ET) Dr. Mehdi Kazemzadeh-Narbat <i>Food and Drug Administration (FDA)</i></p>	 <p>August 12th, 12:00 pm (ET) Prof. Jeff Karp <i>Brigham and Women's Hospital, Harvard Medical School, Serial entrepreneur (Tissium, Altrix Bio, etc.)</i></p>
 <p>August 19th, 12:00 pm (ET) Dr. Amanda Malone <i>CSO, Eupraxia Pharmaceuticals</i></p>	 <p>August 26th, 12:00 pm (ET) Dr. Narges Baniasadi <i>Health Tech and Social Impact Entrepreneur and Investor, Co-founder of Bina Technologies</i></p>
 <p>September 2nd, 12:00 pm (ET) Prof. Massimiliano Paganelli <i>Gastroenterologist/ Hepatologist, University of Montreal, Co-founder and CEO of Morphocell Technologies</i></p>	 <p>September 9th, 12:00 pm (ET) Prof. Shana Kelley <i>University of Toronto, Serial entrepreneur (Cellular Analytics, Xagenic Inc, GeneOhm Sciences)</i></p>
 <p>September 16th, 12:00 pm (ET) Dr. Leila Pirhaji <i>Founder & CEO at ReviveMed, Innovator under 35 by MIT Technology Review</i></p>	 <p>September 23rd, 12:00 pm (ET) Prof. Paul Santerre <i>University of Toronto, Co-director of Health Innovation Hub, Co-founder and CSO of Interface Biologics</i></p>
 <p>September 30th, 12:00 pm (ET) Prof. Milica Radisic <i>University of Toronto, Founder of TARA Biosystems Inc. and Quthero inc.</i></p>	 <p>October 7th, 12:00 pm (ET) Prof. Vahid Serpooshan <i>Georgia Institute of Technology, Emory University School of Medicine</i></p>

Organizers



Prof. Mohsen Akbari
University of Victoria



Prof. Houman Savoji
University of Montreal

Coordinator: Vahid Karamzadeh

Register for Prof. Khademhosseini's talk using this QR code



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Acknowledgments

