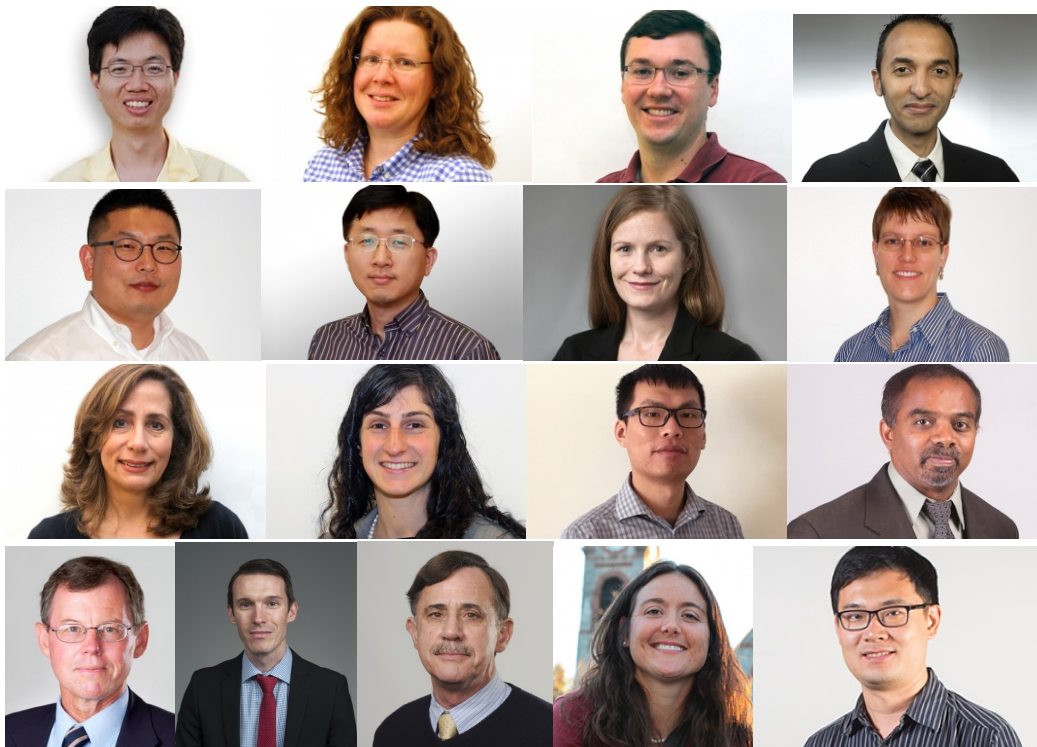


Biomaterials for Devices and Regenerative Medicine (BDRM)

CURRENT RESEARCH AND EXPERTISE



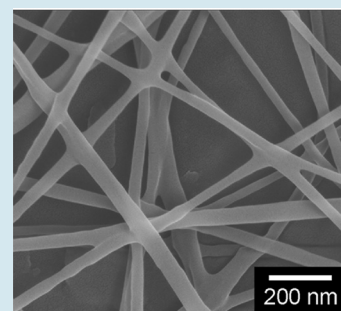
Theme Leader

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Chemical Engineering

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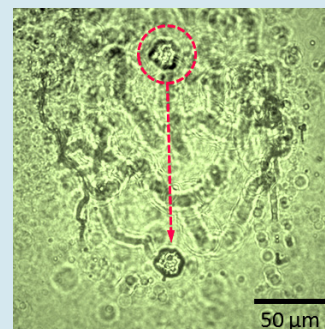
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Drug Eluting Materials

Perry and Schiffman design polymer-based biomaterials for implantable devices, drug delivery systems, and tissue engineering scaffolds.

Image: Wound dressings that release antimicrobials.



High Impact Research

J-H Lee develops novel biomechanical markers and devices to study the micromechanical impact on soft matter, such as brain tissues, skin, and individual cancer cells. **Image** shows a cell moving at 400 mph!

We Specialize in Interdisciplinary Biosciences

BDRM faculty are an interdisciplinary group with combined expertise in biomaterials development, polymer chemistry, tissue engineering, and molecular self-assembly. We put these tools to work in applications in biology, microbiology, and more!

Antimicrobial and Antifouling

- New coating technologies that repel and kill bacteria and other fouling organisms (Klier, Santore, Schiffman)
- New fiber technologies that are tunable and tough but pliable, for applications in non-fouling clothing and coatings (Perry, Schiffman)

Biomaterials

- Hydrogel substrates and brushes to study human and animal cells (J Lee, Peyton, Santore, Sun)
- Self-healing and assembling gels (Crosby, Hayward, Klier, Peyton, Perry)
- Fiber scaffolds that support and encourage cell growth and proliferation (Schiffman, Peyton)

Diagnostic Tools

- Chemical and mechanical tools to understand, image, and treat cancer subtypes (Farkas, J-H Lee)
- DNAs and RNAs platforms for disease diagnostics and therapy (You)
- Milli/Micro-fluidic devices to generate biologically relevant environments (Jiménez, Perry)

Facilitated by state-of-the-art laboratory space and core facilities in the Life Sciences Laboratory, teams of faculty, PhD students, and post-doctoral fellows in BDRM are making new breakthroughs toward solving the grand challenges in biology.

Tissue Engineering and Bioinspired Materials

We aim to synthesize new materials from natural and synthetic polymers

Understand how new materials interact with microbial and human cells, tissues, and biomolecules.

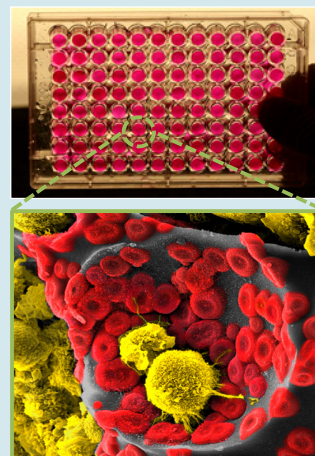
Mechanobiology

We aim to identify how cells sense and respond to mechanical stimuli.

Design new treatment platforms for diseases, artificial tissue constructs, and drug screening based the principles of how cells respond to stimuli.

Treatments and Models of Disease

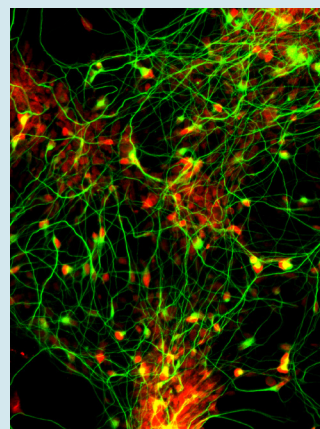
We aim to combine novel materials, transport models, mechanical signals and microfluidics with living systems to study how cells sift through complex information to inform disease onset, progression, and eradication.



Synthetic Tissue Environments

J Lee and Peyton create functional human tissue models to increase the predictive power of preclinical drug tests.

Image: Ex vivo imaging of bone marrow cell culture.



Linking Mechanics to Proper Tissues and Organ Function

Sun and Jiménez use manufacturing tools to create biomimetic models of model human development.

Image: synthetic substrates promote motor neuron differentiation of human pluripotent stem cells, which may be used to treat degenerative diseases like ALS.

Facilitated by:



Research and Innovation to Improve Human Health

BDRM is on the forefront of exciting collaborative, translational, and product-driven science with a mission to improve human health and well-being. Within the new Life Science Laboratories at UMass Amherst, made possible by a \$95-million investment by the Massachusetts Life Sciences Center, IALS houses a vibrant community of interdisciplinary faculty, as well as, state-of-the-art laboratory space and IALS Core Facilities.

The use of **High Throughput Screening**, **Electron Microscopy**, **Light Microscopy**, **NMR**, and **Cell Culture** have been instrumental in the ongoing research efforts of this theme. For more info on the IALS Core Facilities, please visit: umass.edu/ials/core-facilities.