UNIVERSITY OF WYOMING

College of Engineering and Physical Sciences
Chemical and Biomedical Engineering

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Micro- and Nano- Structured PEG hydrogels for Biomedical Applications

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Room – EN2102

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Abstract

Hydrogels have been widely used in biomedical fields, including as platforms for bioactive molecules delivery, biosensors, cell culture, and tissue engineering scaffolds. However, most hydrogels are typically prepared as bulk materials, such as films and monolithic structures, which are not suitable for emerging applications that demand miniaturization for delivery in microscopic environments and delicate control over the hydrogel's properties. We have focused on developing and engineering biomaterials at the microscale by using microfabrication techniques, such as stereolithography, which can mold materials at resolutions of sub-micro-sized features with customizable shapes rapidly, and droplet microfluidics, which allows the fabrication of highly monodisperse, shape-controlled microgels in relatively high throughput and real-time control over droplet composition. Using these approaches, we have engineered immunofunctionalized micromolded hydrogels for circulating tumor cells (CTCs) capture via controlled oxygen-inhibited photopolymerization, and further investigate how photopolymerization parameters quantitatively define microgel interfacial properties, cell adhesive ligand density, and porosity in granular hydrogel tissue scaffolds.

Bio
Jing Liu is a Postdoctoral Associate in the Department of Chemical and Biomedical Engineering at the University of Wyoming, where she works in Professor John Oakey's lab. She earned her PhD in 2023 through the Molecular and Cellular Life Sciences (MCLS) program at the University of Wyoming. Her doctoral research focused on the fabrication of micro- and nano-structured PEG hydrogels using stereolithography and microfluidics for biomedical applications, including biosensing, drug delivery, cell delivery, and tissue engineering. Following her PhD, she continued as a postdoctoral associate in the Oakey lab, where she focuses on developing granular hydrogel tissue scaffolds, a class of biomaterials designed to overcome the limitations of bulk hydrogel in tissue engineering.