

Nanomedicine and Nanoscale Delivery II

Angeliki Andrianopoulou

4th-year PhD Candidate, Pharmaceutical Sciences
University of Illinois Chicago
Gemeinhart Lab

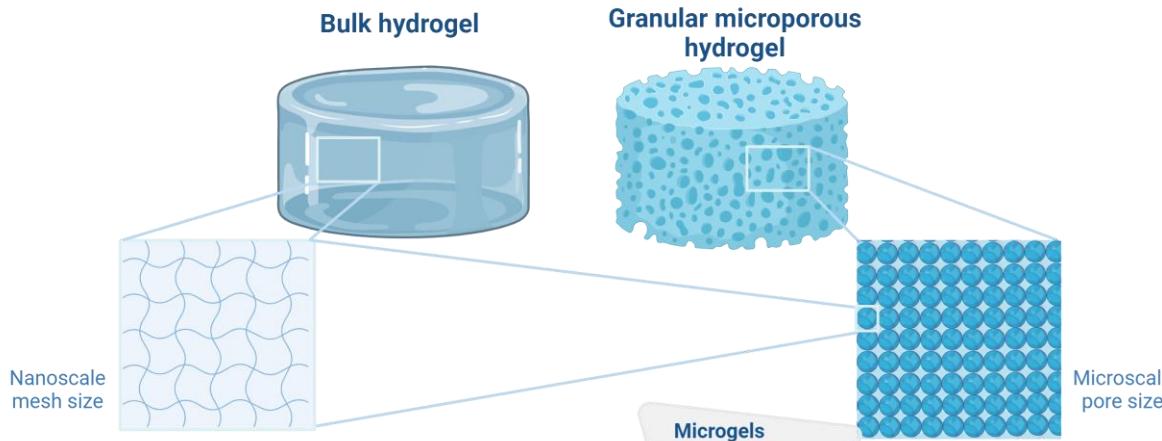
Poster #496



INTEGRATING
Delivery Science
ACROSS DISCIPLINES



Streamlining granular hydrogel fabrication for drug delivery



Fabrication of microgels

- High particle size polydispersity
- Sophisticated designs
- Low production rate

Inherent modularity:

- ✓ High porosity
- ✓ Tunable mechanical properties
- ✓ Injectability

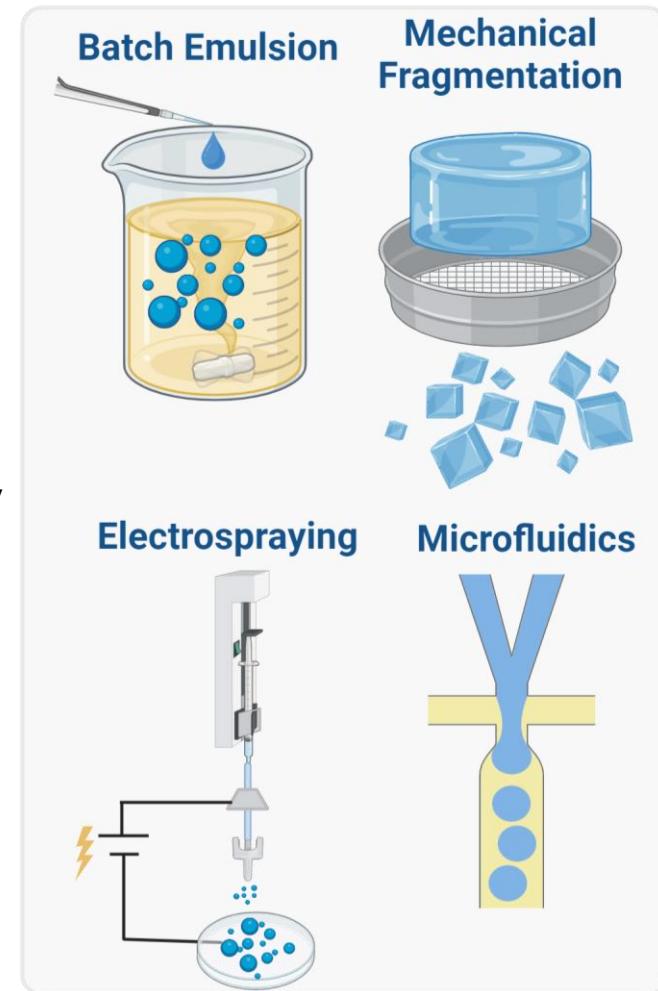
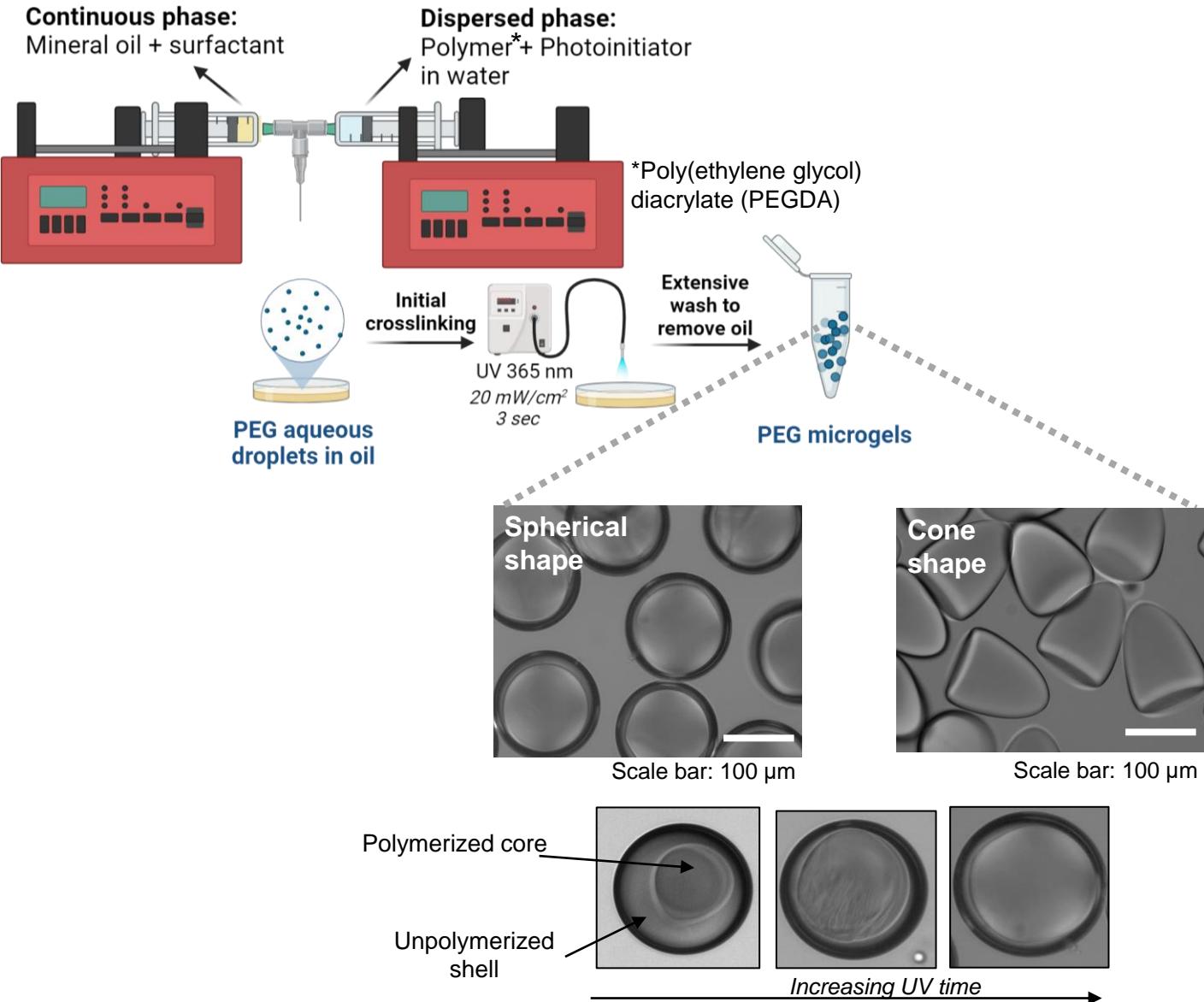


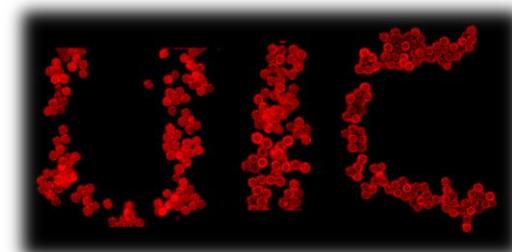
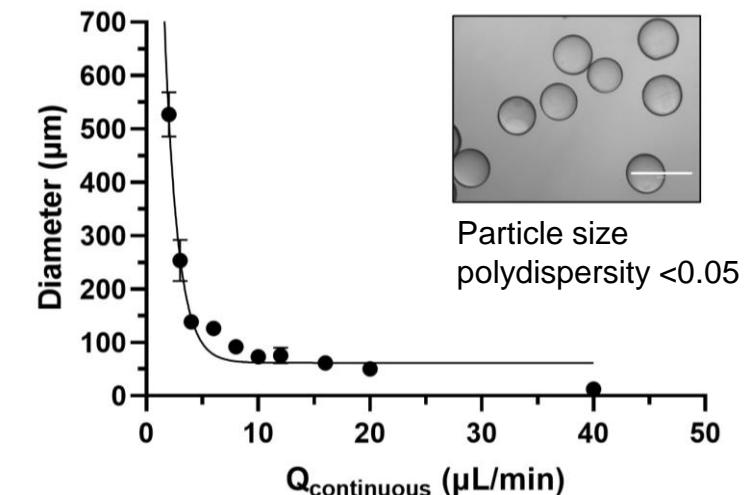
Figure adapted from: Daly, Andrew C., et al. *Nature Reviews Materials* 5.1 (2020): 20-43.

Goal: Develop a simple and versatile method for granular hydrogel fabrication.

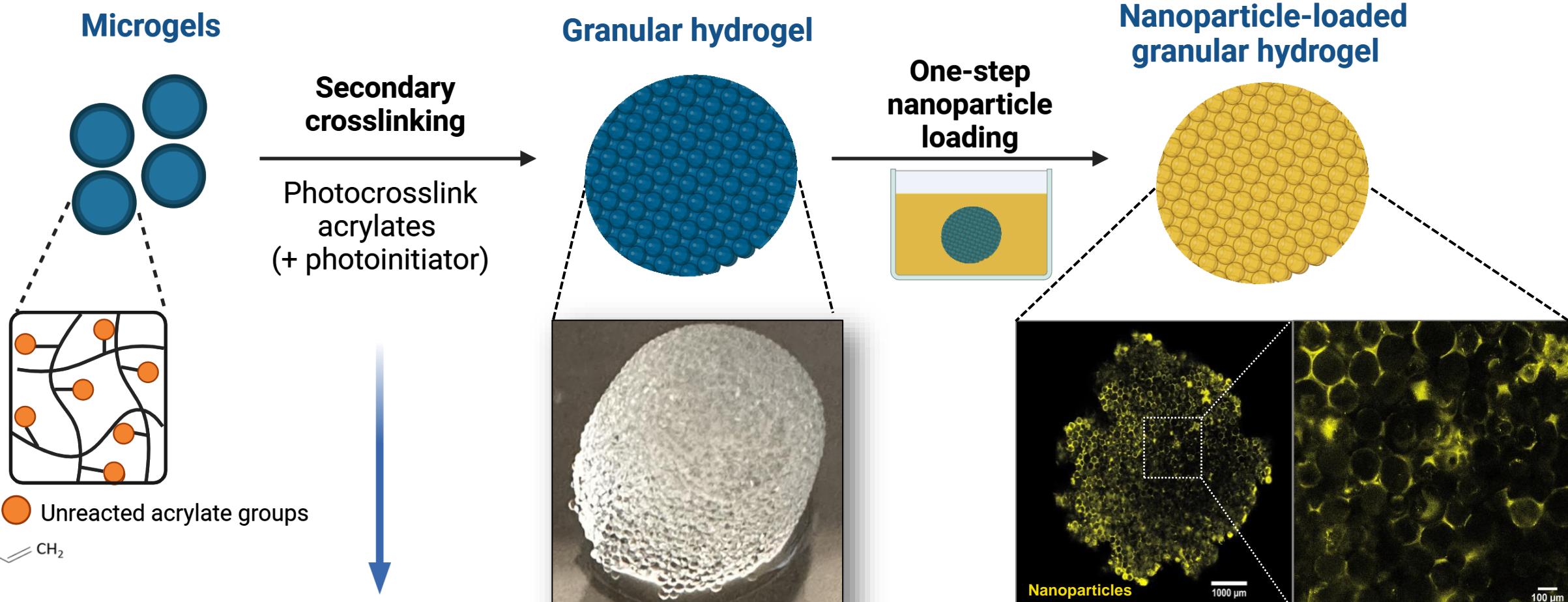
Droplet-based emulsion hydrogel formation method



Tunable sizes ranging from 10 μm to 500 μm by adjusting the flow rate ratio



Granular hydrogel formation by secondary crosslinking of microgels



 **New method to assess availability of acrylate groups for secondary crosslinking**

Thiol-ene click chemistry reaction and fluorescamine assay.

Confocal microscopy imaging of nanoparticle-loaded granular hydrogels.

Granular hydrogel formation by secondary crosslinking of microgels

Microgels

Granular hydrogel

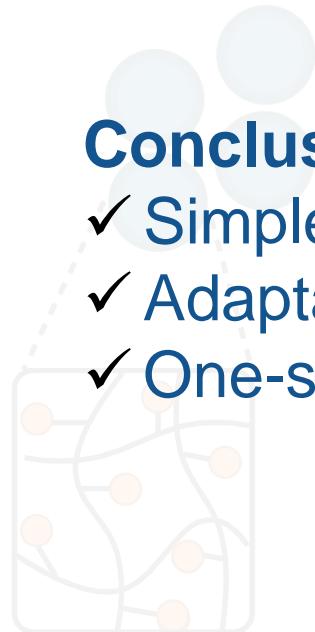
Nanoparticle-loaded granular hydrogel

Secondary crosslinking

One-step nanoparticle loading

Conclusions

- ✓ Simple, accessible, cost-effective method for granular hydrogel fabrication
- ✓ Adaptable to various polymers
- ✓ One-step nanoparticle loading approach for various drug delivery applications



Unreacted acrylate groups



New method to assess availability of acrylate groups for secondary crosslinking

Thiol-ene click chemistry reaction and fluorescamine assay.



Photocrosslink

Nanoparticles



100 μm



Confocal microscopy imaging of nanoparticle-loaded granular hydrogels.

Gemeinhart Lab

Sonia Alavi

Jay Teamer

Elizabeth Gutierrez

Dr. Richard A. Gemeinhart

Lee Lab

Confocal Microscope and technical assistance

Zhao Lab

EVOS m5000 imaging system

Thank you!

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