# Marley J. Dewey

## *Mineralized collagen composites for bone regeneration of craniomaxillofacial defects*

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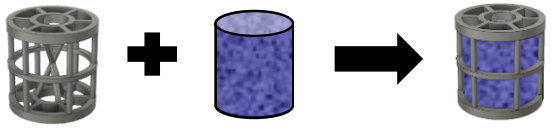
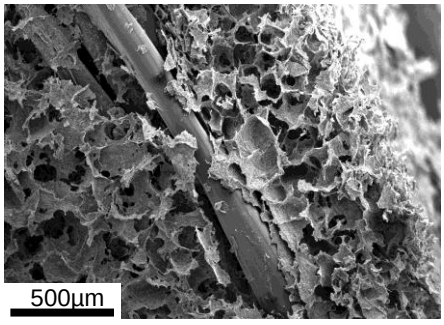
## ABSTRACT:

Craniomaxillofacial defects are critical sized bone defects of the skull that will not heal naturally without surgical intervention. Healing these defects requires overcoming problems such as defect shape irregularity, implant resorption or ejection by the body, and resisting chronic inflammation and bacterial infections. Mineralized collagen scaffolds have been used extensively for these applications to promote new bone growth, due to their bioactivity, mineral content, and porous structure. However, these scaffolds lack the proper mechanical support and do not modulate the immune response or resist bacterial infections.

My project focuses addressing osseointegration into mineralized collagen scaffolds by adding 3D printed mechanical supports and modulating the immune response and bacterial resistance by incorporating the amniotic membrane derived from placentas. Current work involves developing 3D prints to be added to the mineralized collagen to increase mechanical properties and add shape-fitting behavior, as well as incorporating the amnion due to its anti-microbial and anti-inflammatory properties.



PLA 3D print | Mineralized collagen scaffold | Collagen-PLA composite




PLA fiber within porous mineralized collagen

## AWARDS/PUBLICATIONS:

- National Science Foundation Graduate Research Fellowship
- Illinois Scholars for Undergraduate Researchers Mentor
- Dow Chemical Soft Materials Presentation Silver Award
- Racheff Teaching Fellowship
- Hamer Fellowship
- *In review*: Dewey, M., et al. “Shape-fitting PLA-collagen composite biomaterial promotes osteogenic differentiation of porcine adipose stem cells.”