

MURC 2019

Presentation ID: 254

Presentation Format: Poster Presentation

Presentation Title: 3D Printing Bone Scaffolds

The scope of the project was to create a porous bone graft of polylactic acid (PLA) through additive manufacturing to replace a segment of defected long bone with a diameter and height of 30mm and 60mm respectively, with various truss structures that could replicate the structural strength of bone under axial compressive stress. For the design of the interior porous structure the porosity will be approximately 70%. Three structural designs were considered based on literary research: tetrahedral truss, octet truss and diamond-TPMS (Triply Periodic Minimal Surface).

Four samples of each design were 3D printed, of which three each were tested. The tetrahedral design structure showed the highest Young's Modulus and Yield Strength, however the failure mechanisms showed that it failed layer by layer with an undulating stress-strain curve, which is not ideal. The d-TPMS structures provided an optimal combination of high yield stress and Young's modulus, low variability amongst samples, and predictable post-yield behaviour. After a cost analysis of the process, the 3-D printed PLA structures were theorized to be at least 50-70% cheaper than other synthetic alternatives and about 90-95% cheaper than biological alternatives. Further recommendations of the project include testing the grafts under axial compressive stress, altering the pore size, and individual cell size of the trusses to improve strength, reliability and osteoconductivity.

Commented [C17]: Can you explain this?
Commented [C18]: Why are you conducting this research? What is the significance?

Themes:

Check (highlight) the most applicable theme according to the abstract.

<input checked="" type="checkbox"/> Innovation and Technology	<input type="checkbox"/> Health and Wellness	<input type="checkbox"/> Culture and Society	<input type="checkbox"/> Sustainability and Conservation
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Comments:

As MURC is a generalist conference, I suggest moving away from jargon as your abstract has quite a bit. I also suggest beginning your abstract with some background information or reason as to why you are conducting this study. Your current abstract does not touch upon the significance of your research.