



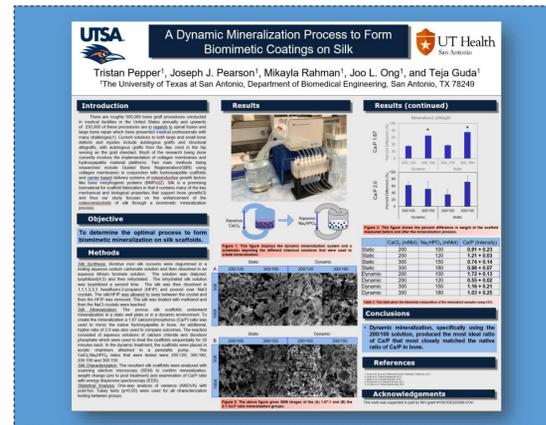
A Dynamic Mineralization Process to Form Biomimetic Coatings on Silk

Tristan Pepper, Biomedical Engineering, 2023

Intellectual Achievement

SUMMARY

Through my first semester at UTSA I had the phenomenal opportunity to conduct academic research within Dr. Teja Guda's laboratory. I studied methods of mineralization using silk scaffolds for the purpose of stem cell differentiation into osteocytes (bone cells) for future development of functional ligament regeneration for patients. The overall goal was to use mineral solutions in varying concentrations with different methods of mineralization such as dynamic(moving) or static(still) flow to achieve an ideal ratio of calcium to phosphorus on the surface of the scaffolds to mimic calcium phosphate and allow seeded stem cells to differentiate into bone cells. Much of my work included data analysis, SEM electron microscope imaging, scaffold fabrication, cell work, and 3D modeling



SPICES

This experience has enveloped several of the SPICES including professional development(P) via the development of laboratory skills such as cell incubation and culture transfer, and intellectual achievement beyond the classroom(I) as I took on my own piece of a larger graduate project.

HERBS

The HERBS Incorporated in this experience include an Honorable(H) dedication to integrity of research, Resilience(R) of time commitment, and Benevolence(B) through my aspiration to make contributions to research to improve quality of life.

LEARNING OUTCOMES

The process of academic research is the embodiment of the honors college primary mission which is to facilitate learning through experiential opportunities. Training as a researcher has been, and will continue to be, an essential aspect of my undergraduate career. Combined with my engineering coursework, it will prepare me for my future career and educational goals, primary among these is to attend graduate school to pursue a PhD within the Biomedical Engineering Sciences.



IMPACT

Personally, as this was my very first large-scale research project, I learned much about the scientific process of research and how long it truly takes to put together relevant results that can be published. I learned how to properly apply the material that I have been learning in many of my educational courses such as chemistry and biology. The professional setting of a lab was shocking at first and I had to learn to act as a professional rather quickly. Overall, the impact of this experience cannot be overstated in that ultimately my resolve of pursuing research has been solidified.

ADVICE

For those who seek to pursue academic research the time is right now. Do background research on the field and professors you are most interested in and email them to inform them of your interest. When emailing research professors be sure maintain a formal tone and provide a cover letter.