

SUMMER RESEARCH 2024/25

PROJECT ABSTRACT



THE UNIVERSITY OF
WAIKATO
Te Whare Wānanga o Waikato

PROJECT # 40

SUPERVISOR/S:	Dr. Leandro Bolzoni
PROJECT TITLE:	Characterisation of new metallic biomaterials
FIELD:	Materials Science and Engineering
DIVISION/SCHOOL:	HECS - Te Kura Mata Ao School of Engineering
PROJECT LOCATION:	Hamilton

PROJECT ABSTRACT:

The aim of this Summer Research Project is to consider the characterisation of innovative metallic Ti-based materials biomaterials with antibacterial activity in order to assess whether these novel materials with appropriate level of technological and mechanical performances can successfully be attained. Specifically, novel Ti alloys made via powder metallurgy will be characterised in terms of physical, chemical, mechanical and microstructural behaviour. The production of the selected compositions via powder metallurgy limits the manufacturing costs where the investigation is based on changing the ratio and amount of different alloying elements to tailor the physical microstructural, mechanical and biological response. The project aims to demonstrate the feasibility of manufacturing smartly designed functionalised Ti alloys.

STUDENT SKILLS:

- Understanding of materials science's basic concepts such as phase diagrams and how they can be used to develop new alloys.
- Good practical skill and previous experience on materials' preparation is a must.
- Knowledge on manufacturing processes, especially powder metallurgy is desirable.
- Ability to use fundamental engineering knowledge to solve technical issues related to applied experimental research.
- Good communication and writing skills combined with a solid materials science background to be able comment, discuss and interpret experimental results on the basis of scientific principles.

PROJECT TASKS:

1. Measuring the physical properties of the alloys through applying basic physics law such as Archimedes' principle.
2. Prepare the materials for the quantification of the microstructure which will involve optical and/or electronic microscopy.
3. Perform mechanical testing including determine the tensile behaviour and hardness response of the newly made alloys.
4. Critically analyse the results to explain the behaviour of the alloy using scientific and engineering principles.

EXPECTED OUTCOMES:

- Student's Research Poster (as per clause 6 of the [Scholarship regulations](#))
- This research project is set to strengthen a recently established research partnership between the UoW Te Kura Mata Ao School of Engineering and the Te Aka Mātuatua School of Science around the development of new metallic biomaterials with antibacterial activity. The data generated by the Summer Research Scholarship student will be complemented with other data about the behaviour of these new materials to be published in peer-reviewed scientifically recognised scientific journals. The realisation of this project has the potential to provide scientific understanding for future bidding of external funding.

