

Project 33: In-Situ Studies of Strain Rate Effects on Phase Transformations and Microstructural Evolution in β -Titanium

- Student: Benjamin Ellyson (Mines)
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Project Duration

PhD: September 2017 to May 2021

Problem: Uniform elongation and work hardening of titanium alloys restricts applications.

Objective: Fundamentally understand microstructural evolution in metastable β titanium alloys to develop an alloy design methodology and tailor microstructures and properties.

Benefit: Novel titanium alloys for blast and crash resistant applications

Recent Progress

- Heat treatment performed to obtain β phase microstructures that exhibit TRIP/TWIP
- Compressive testing of solution treated samples partially completed
- Investigation of low-temperature, short soak time treatments is under way
- Initial thermo-mechanical testing completed in the Gleeble

Metrics

Description	% Complete	Status
1. β solution treatments	95%	●
2. Literature review	50%	●
3. High-throughput quasi-static compression testing to β solution heat treatment	90%	●
4. Optical microstructural characterization of pre and post compression conditions	80%	●
5. EBSD/TEM microstructural characterization of pre and post compression conditions	10%	●



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