# Project 22: Formation, High Temperature Stability and Mechanical Properties of Microeutectics in Bulk Solidified Al-Fe-Si-V and Related Alloys

- Student: Joe Jankowski (Mines)
- Advisor(s): Michael Kaufman, Amy Clarke (Mines)

**Project Duration**
PhD: June 2015 to August 2019

Problem

Aluminum alloys with acceptable high temperature structural properties are expensive and difficult to produce.

Objective

Develop high-temperature, high-strength Al alloys without use of rapid solidification by forming stable microeutectic.

Benefit

Reduce production cost and increase selection of high performance high-temperature Al alloys.

Recent Progress

- Began cooling rate / repeatability analysis
- DSC analysis of Al-Fe-Mn-Cr-Si alloys
- Charge density determination using MEM/Rietveld method

| Metrics | | |
|---|---|---|
| **Description** | **% Complete** | **Status** |
| 1. Develop experimental protocols for reproducible castings | 90% | ● |
| 2. Make castings from baseline material to identify key research questions | 100% | ● |
| 3. Develop crystallography / phase stability knowledge of α-phase | 50% | ● |
| 4. Assess ability to produce microeutectic in chill castings | 50% | ● |
| 5. Determine how fundamental solidification parameters affect microeutectic formation | 5% | ● |