



December 2024

Master's Project/Research Intern Position in Materials Science and Engineering

Investigation and Modeling of Intermetallic Fragmentation and Its Effect on Precipitation and Recrystallization in Al 6xxx Alloys during Hot Rolling and Cold Rolling

Project advisers:

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Context:

The production of recycled aluminum plays a crucial role in reducing carbon emissions compared to primary aluminum production. Nevertheless, in recycling products, specific elements contribute to the formation of intermetallics containing Fe and Mn. These intermetallics play a key role in precipitate nucleation and affect the recrystallization process by controlling grain growth dynamics. Alloy composition and rolling conditions also influence the distribution of Fe-Mn intermetallics. Understanding the final distribution of these intermetallics is essential for assessing their impact on precipitation, recrystallization, and final material properties such as formability, surface quality, and bending capabilities. Insights gained from this research can help the industry incorporate more recycled products and expand alloy compositions.

Proposed work:

The primary objective of this project is to study the fragmentation of intermetallics during industrial hot rolling and cold rolling under varying rolling conditions and alloy compositions in Al 6xxx alloys. The project will involve analyzing SEM data from different conditions and modifying an existing fragmentation model accordingly. The model has already been developed but requires extensions to account for a variety of deformation and composition conditions. A detailed study will also need to be conducted to correlate intermetallic distribution with precipitation and recrystallization.

The student will receive initial training in electron microscopy techniques and using the available fragmentation model.

Ideal start date, duration: 1st February 2025, 6 months

Candidate Profile:

- Bachelor's or Master's degree in Materials Science or a related field
- Interest in observation and data analysis
- Familiarity with Python programming
- Experience with Scanning Electron Microscopy (SEM)

Location: EPFL-LMTM (Neuchâtel, Switzerland)

Please **apply** by email to ezzatollah.moosavi@epfl.ch with the subject line "Application for LMTM – Your Name". Please include your CV with grades.