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Master's project/ Master's thesis in Materials Science and Engineering

Investigation and Statistical Analysis of Precipitates and Intermetallics in Al 6xxx Alloys under Hot Rolled and Cold Rolled Conditions

Project advisers:

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Context:

The production of recycled aluminum plays a key role in decreasing carbon emissions in contrast to primary aluminum production. Nevertheless, in recycling products, specific elements contribute to the formation of intermetallics containing Fe and Mn, thereby influencing their number density. These intermetallics facilitate nucleation of Mg_2Si and Si precipitates. Alloy composition and rolling conditions also determine the distribution of precipitates and Fe-Mn rich intermetallics. Analyzing the final distribution of these precipitates and intermetallics is essential for understanding their impact on recrystallization and material texture, affecting the processability and final sheet properties, including formability, surface quality, and bending capabilities. Such insights empower the industry to incorporate more recycled products, expanding alloy compositions.

Proposed work:

The primary objective of this project is to investigate Mg_2Si and Si precipitates and AlFeMnSi intermetallics distribution in Al 6xxx alloys with different compositions, subjected to different hot rolling and cold rolling conditions such as rolling speed and final thickness. To achieve this, the student will receive initial training in sample preparation and acquire skills in utilizing SEM and EBSD techniques. Subsequently, data obtained from SEM will undergo statistical analysis through an image analysis procedure using dedicated software. The software will automatically provide information on the volume fraction, number density, and mean radius of precipitates and intermetallics. The ultimate outcome will encompass their size distribution.

Candidate profiles: The candidate should have a bachelor in materials science, be curious and resilient, and should like observing, data analyzing, and understanding.

Location: EPFL-LMTM (Neuchâtel, Switzerland)

Please **apply** via email to ezzatollah.moosavi@epfl.ch using the subject line "Master's application for LMTM – Your Name." Please provide your CV incl. grades.