An Analytical Study of the Preferential Grain Orientation Attack of Slip Bands in Al-Lithium Alloys

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Objective:
Determine the preferential orientation of attacked slip bands through scanning electron microscopy (SEM) and electron backscatter detection (EBSD). Understand the mechanisms behind the attack by characterizing the precipitates forming on the slip bands using transmission electron microscopy.

Approach:
Corrode a peak-aged sample of a 2xxx series Al-Li alloy with an ASTM G110 solution of NaCl and hydrogen peroxide in water. Identify the orientation of the attacked grains. Prepare a sample for TEM using focused ion beam (FIB), and perform energy-dispersive x-ray spectroscopy (EDAX) on the precipitates found on the slip bands.

Results:
Preferred orientation determined to be the [001] orientation, though corrosion was not limited to a certain orientation. Precipitates were found to be Al-Cu-Mn-Li intermetallic dispersoids.

Conclusions:
Attack was not limited to a single orientation, but appeared to favor the [001] orientation. Precipitates in non-corroded area were smaller and more spherical than the precipitates in the corroded areas, but of similar composition. The size of the precipitates may be affecting the attack of the slip bands, but more observation and characterization are required.