$Al_3(Zr,Sc)$ Particles in Twin-Roll Cast Al-Li Alloy

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Abstract Al-Li-based alloys have been recently widely used in aerospace, aviation, and military applications thanks to their high strengths, low density, good corrosion resistance, and fracture toughness. The properties could be further improved by microalloying with Sc, which forms together with Zr dispersion of fine Al3(Sc,Zr) precipitates. They form above 300 ºC. They further increase the strengths of materials and decrease their susceptibility to undesirable grain growth during their thermomechanical treatment. Long-term high-temperature treatment typical for a necessary homogenization of traditionally prepared direct-chill cast materials, however, deteriorates the favorable effect of Sc addition due to the coarsening of Al3(Sc,Zr) precipitates occurring above 450 ºC. Therefore, twin-roll casting forming finer dispersion of primary phases, and requesting shorter annealing times and lower temperatures during homogenization, could be an appropriate processing method fully exploiting the potential of the Sc addition. The evolution of Sc particles in twin-roll cast Al-Cu-Li-Mg-Sc-Zr alloy during high-temperature annealing was studied in the contribution. A characterization of core-shell Al3(Sc,Zr) dispersoids by enhanced TEM methods was performed.