

6 CONCLUSIONS

-The microstructure of the grain refiners consisted of an aluminium matrix, TiAl_3 particles and TiB_2 particles. Silicon particles and occasionally, titanium carbide particles were present due to contamination.

-The TiB_2 particles in the grain refiners were coarser than in commercial grain refiners and their size distribution was skewed.

-The size of the TiAl_3 particles increased with increasing titanium content and their morphology became complex.

-The performance of the grain refiners was poor compared to commercial grain refiners probably due to agglomeration and settling of TiB_2 particles and the elongated TiAl_3 particles.

-Cold rolling improved the performance of the grain refiners.

-Annealing after cold rolling had a deleterious effect on the performance of the grain refiners.

-A smaller grain size in the as cast grain refiner resulted in improved grain refining performance after cold rolling.

-As predicted by the Tronche and Greer¹⁵ model, the efficiency of the grain refiners improved with increased proportion of TiB_2 particles.

-Attention to processing parameters such as temperature, sequence of feed material addition and chemical composition is indicated for improved grain refiner production.