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## Compression properties enhancement of Al-Cu alloy solidified under a 29 T high static magnetic field

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### Abstract

Bulk solidification of Al-40wt.%Cu hypereutectic alloy has been investigated using a high static magnetic field (HSMF). The results show that, by imposing a 29 T HSMF, the melt convection has been completely suppressed in the mushy zone and the whole scale. The primary Al<sub>2</sub>Cu faceted phase changed to non-faceted phase because of the growth enhancement of Al<sub>2</sub>Cu precipitates. Al-Al<sub>2</sub>Cu eutectic was destabilized as a coexisting of lamellar and rod-like  $\alpha$ -Al phase under 0 T whereas it was stabilized as a lamellae under the 29 T HSMF. The dimension of primary Al<sub>2</sub>Cu precipitates has been refined. The interlamellar spacing of eutectic Al-Al<sub>2</sub>Cu structure has been reduced from 6.3  $\mu\text{m}$  to 2~3  $\mu\text{m}$ . The primary Al<sub>2</sub>Cu precipitates were almost oriented to its <001> crystal direction which was parallel to the direction of the vertical HSMF. The morphologies of shrinkages displays as approximately regular spheres. Compressive strength of Al-40wt.%Cu alloy has been enhanced from 248 Mpa to 431 Mpa and the maximum stain has been improved from 3.6 % to 5%. This paper reveals the effect of HSMF on Al<sub>2</sub>Cu precipitates, provides a new sight

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