

● Ultrasonic Processing of Materials

Oak Ridge National Labs

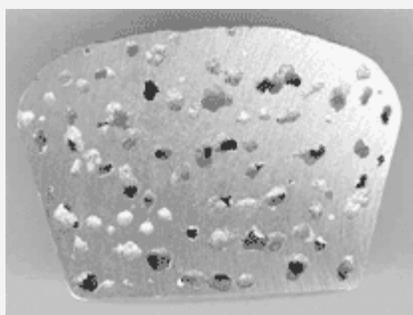
[Qingyou. Han](#)

University of Tennessee

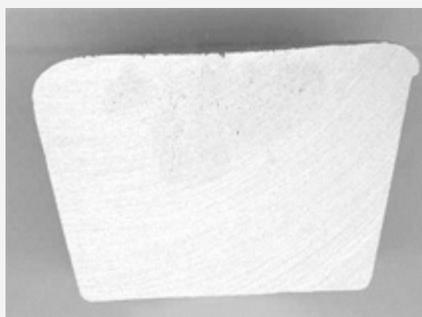
Thomas T. Meek, Cailu Xu, Xiaogang Jian,
Hanbing Xu

Goals and Objectives: The goals of this research is to explore the use of high-intensity ultrasonic vibrations for degassing of molten aluminum, grain refinement during solidification, and ultrafine grain formation in the solid metals.

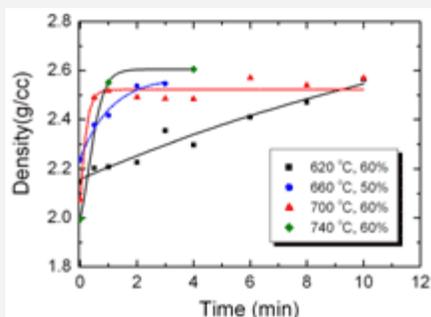
Degassing in Molten Aluminum



Without ultrasonic vibration

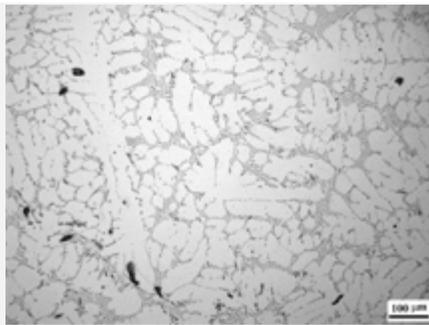


With ultrasonic vibration

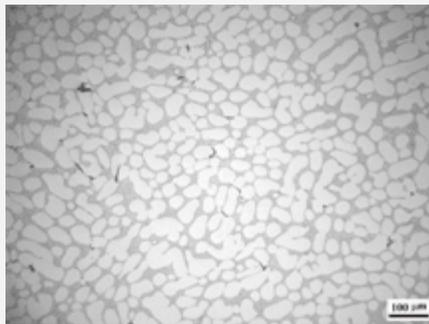


Density vs. Vibration Time

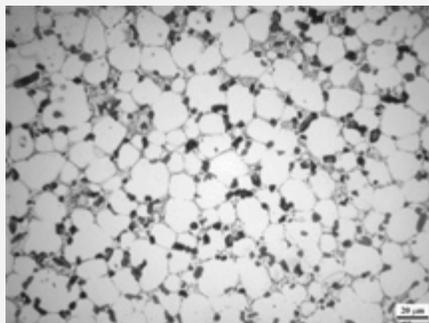
Grain Refinement During Solidification



Without ultrasonic vibration

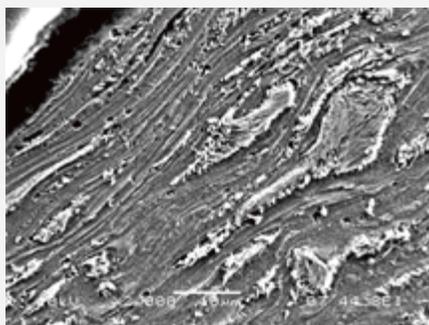


With ultrasonic vibration

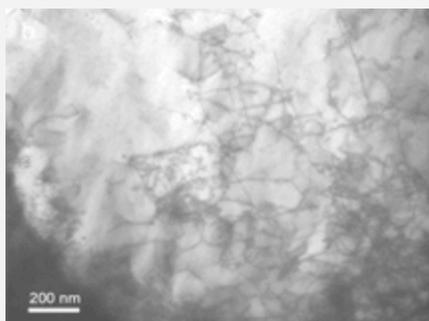


With ultrasonic vibration and special thermal management

Solid State: Ultrasonically Induced Deformation



SEM image of several plastic deformation in low carbon steel



TEM image of fine structures in the severe plastically deformed regions

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