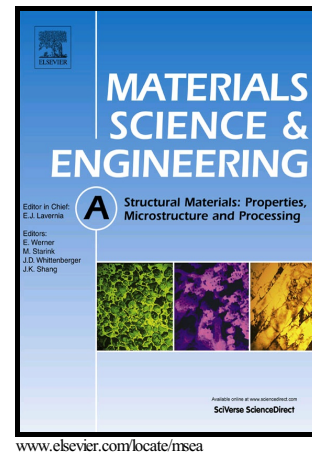


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**Effects of ultrasonic vibration treatment on particles distribution of TiB₂ particles reinforced
aluminum composites**

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Abstract:

The ultrasonic vibration treatment is successfully applied to improve the particles distribution of in-situ 2.5 vol% TiB₂ particles reinforced Al-4.5Cu alloy matrix composites fabricated by salt-metal reaction process. Large particles aggregates are eliminated by effects of the cavitation and the acoustic streaming of ultrasonic vibration for 30 s. All the particles aggregates are eliminated and the particles are uniformly distributed in the melt after treated by ultrasonic vibration for 120 s. TiB₂ particles are identified by X-ray diffraction and transmission electron microscope analysis. Some TiB₂ particles are dispersively distributed in the matrix after solidification. The composite treated by ultrasonic vibration for 120 s has the optimal improvements of yield strength and ultimate tensile strength, which increased by are 84 % and 39 % respectively. The strengthening mechanisms are discussed, the improved particles distribution brings enhancements on Orowan strengthening, Thermal expansion mismatch strengthening, grain refinement, etc., which are responsible for the improvements of mechanical properties.

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