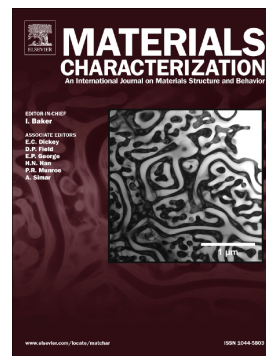


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## ZrTiAlV alloy grain refining under high-pressure torsion and electric field-assisted heat treatment

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**Abstract:** To reduce grain size, shorten heat treatment time, and guarantee good comprehensive mechanical properties of ZrTiAlV alloy, we proposed a grain refining technology, which is a combination of electric field-assisted heat treatment and high-pressure torsion. And using this technology we studied ZrTiAlV alloy grain refining. The original material consists of pure phase  $\alpha$ , which will be changed into pure phase  $\beta$  at temperatures exceeding 700 °C during electric field-assisted heat treatment. The temperature required for the phase  $\alpha$  of the high-pressure torsion material to be completely changed into phase  $\beta$  increases obviously. When the torsion pressure is 5 GPa, the initial heat treatment temperature is higher than 700 °C and the final heat treatment temperature reaches 800 °C, only then can the phase  $\alpha$  be completely changed into a phase  $\beta$  structure. When the initial heat treatment temperature is higher than 600 °C, the large grains of phase  $\beta$  contain a large amount

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