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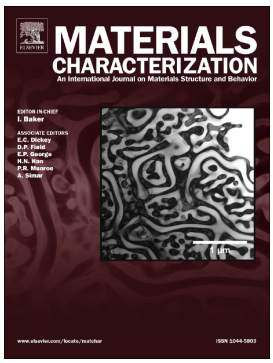

The pore growth process and pore coalescence process in Gasar copper

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The pore growth process and pore coalescence process in Gasar copper

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Abstract: The 3D pore morphology of an optimized Gasar copper ingot was characterized using X-ray tomography and the optimized Gasar copper ingot was fabricated by the Bridgman-type directional solidification method. Three types of typical pore morphology were selected to perform quantitative analysis. The pore growth process and pore coalescence process in Gasar metals were investigated. The pore growth process in the Gasar metals could be divided into three distinct stages: (1) initial growth stage, (2) steady-state growth stage, (3) interruption stage. The pore growth or the increase of pore volume is due to the pressure change inside the pore and the hydrogen supply from the surrounding melt. Dominant factor is different at three stages. A model of pore growth process is proposed, which can describe the evolution from the initial growth to the coupled growth of solid/gas phases and elucidate the pore interruption mechanism. In addition, aiming at the pore coalescence, the shape evolution processes of two types of pore coalescences are shown in detail and a shape evolution model is established. The shape evolution of pore coalescence process can be divided into five stages:(a)starting state;(b) externally tangent state;(c) common tangent state;(d) internally tangent state;(e) ending state. The predicted shape evolution agrees well with the experimental results.

Key words: Porous metal; Gasar; Directional solidification; Pore growth; Pore Coalescence

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