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研究论文

含有烧结助剂的复相陶瓷材料烧结过程的元胞自动机模拟

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摘要： 基于晶界能和晶界曲率的晶粒生长驱动力理论, 建立了含有烧结助剂的复相陶瓷晶粒生长的元胞自动机模型并进行了模拟。结果表明, 烧结助剂对晶界有着强烈的钉扎作用, 其晶粒生长指数小于未含烧结助剂时的生长指数。模拟结果与制备的含有烧结助剂的Al2O3/TiN复相陶瓷材料微观形貌组织吻合, 表明所建立的模型适用于含有烧结助剂的陶瓷材料烧过程模拟。

关键词： 无机非金属材料 元胞自动机 陶瓷材料 烧结助剂

Cellular Automata Simulation of the Ceramic Material Sintering Process with Sintering Additives

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Abstract: A grain growth simulation model for ceramic material sintering process with sintering additives based on cellular automata is constructed based on the grain growth driving force theory of grain boundary energy and the curvature of the grain boundary. The results show that the sintering additives on the grain boundarles have a strong pinning effect. The grain growth index of the ceramic material with sintering additives is lower than that without sintering additives. Add sintering additives can effectively refine the grains The simulation results are in good agreement with the microstructure of Al2O3/TiN ceramic materials with sintering additives. Cellular automata model is applicable to the grain growth simulation of the ceramic material with sintering additives in sintering process.

Keywords: inorganic non-metallic materials cellular automata ceramic material sintering additives

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