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放电等离子烧结制备WC-Co硬质合金温度分布的数值模拟

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摘 要:以WC-Co复合粉末为烧结原料, 在实验测定石墨模具和试样的物性参数的基础上, 采用有限元法对硬质合金SPS过程中烧结系统的温度分布进行研究。结果表明: 试样烧结过程中, 烧结系统内的温度分布不均匀, 烧结温度较低时, 高温区域位于硬质合金试样内, 随着烧结温度的升高, 高温区域向压头转移, 热量由试样和压头向模具传递; 试样中心温度高于模具中心的测定温度, 它们之间的差值与试样加热速率变化趋势一致。模具中心温度的模拟预测结果与实验测定结果基本吻合。

关键字: WC-Co硬质合金; 放电等离子烧结(SPS); 温度分布; 有限元法

Simulation of temperature distribution during spark plasma sintering to synthesize WC-Co cermets

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Abstract: By using the WC-Co powders as the sintering material, based on physical parameters of graphite and sintering samples measured by experiments, the temperature distribution during SPS process to synthesize WC-Co cermets is simulated by finite element method. The results show that there is a greatly inhomogeneous temperature distribution in the SPS system. The highest temperature zone lies in the sample at lower sintering temperature, and moves forward to the punch with increasing sintering temperature. The temperature of the center of die is lower than that of the center of sample and the change of its difference is in accordance with the change of heating rate. It is concluded that the heat transfers from the punch to the die. The prediction results show a good agreement with the experimental measurements

Key words: WC-Co cermet; spark plasma sintering (SPS); temperature distribution; finite element method

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