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技术及应用

干凝胶法制备空心玻璃微球的炉内成球过程分析

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摘要 基于干凝胶粒子炉内成球过程的分解实验结果及各阶段中间产物的分析测试结果，通过对干凝胶法制备空心玻璃微球工艺的传热、传质和运动的过程分析，将干凝胶法制备空心玻璃微球炉内成球过程合理简化为吸热、封装、气泡形成及聚并、精炼、冷却5个阶段。吸热阶段的升温速率以及发泡剂的分解温度和发泡效率、精炼阶段的精炼时间和温度、冷却阶段的冷却速率是影响干凝胶法制备空心玻璃微球工艺和空心玻璃微球最终质量的关键因素。

关键词 干凝胶法 空心玻璃微球 惯性约束聚变 靶制备

分类号

Transformation Process From Dried-Gel Particle to Hollow Glass Microsphere in Drop-Tower Furnace by Sol-Gel Technology

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Abstract Based on the results of analytical experiments on the fabrication process of hollow glass microspheres (HGMs) in drop-tower furnace and the test results of intermediate product of different stages, the heat, mass and momentum transfer processes in the transformation from dried-gel particle to HGMs were studied. The transformation process from dried-gel particle to HGMs in drop-tower furnace was characterized as heating, encapsulating, foaming, refining, and cooling stage. Furthermore, the heating and encapsulating rate of dried-gel particle, the decomposition temperature and gas-forming ratio of blowing agent, refining time of liquid HGMs, and cooling rate of liquid HGMs are found to be the key parameters to the quality of HGMs.

Key words sol-gel technology hollow glass microsphere inertial confinement fusion target fabrication

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