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泡沫铝两步法制备工艺用新型发泡剂的热分解行为

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摘 要: 研究一种适于两步法制备泡沫铝工艺用新型发泡剂的热分解行为, 分析其分解过程中的动力学与热力学特征, 以及发泡气体与熔体之间可能存在的反应。研究表明: 该新型发泡剂具有分解温度范围宽、分解过程缓慢的特点; 其在熔体中的发泡过程主要受化学反应控制; 新型发泡剂所释放的氧化性气体与熔体发生反应, 在气泡表面所形成的连续氧化膜, 对稳定气泡形貌、减缓气泡的合并和长大有重要作用; 该新型发泡剂在两步发泡法制备泡沫铝过程中表现出前期损耗率低、后期发泡效率高的优异性能。

关键字: 泡沫铝; 新型发泡剂; 两步发泡法; 热分解行为

Thermal decomposition behavior of novel gas-generating agent used for two steps foaming process of aluminum

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Abstract: The thermal decomposition behavior of a novel gas-generating agent (NGGA) used for two steps foaming process of aluminum was investigated, its kinetic and thermodynamic characteristics of decomposition reactions, and the potential reactions between the foaming gas and the melt were analyzed. The results show that the novel gas-generating agent has a wide decomposition temperature range and a slow decomposed rate, and its decomposition reactions during the melt are mainly controlled by chemical reaction process. The presence of an oxidizing gas released by NGGA, leads to reactions with the liquid melt, forming a continuous oxide film on the surface of the cell. The presence of the film has a significant effect on the foam stabilization, slowing down cell coalescence and growth. The NGGA exhibits a super performance with a low waste ratio in the former step and a high foaming efficiency in the later step during the two steps foaming process of aluminum.

Key words: aluminum foam; novel gas-generating agent; two steps foaming; thermal decomposition behavior

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