

Microstructure and Sintering of Boron-Alloyed Martensitic Stainless Steel

Authors : Ming-Wei Wu, Yu-Jin Tsai, Ching-Huai Chang

Abstract : Liquid phase sintering (LPS) is a versatile technique for achieving effective densification of powder metallurgy (PM) steels and other materials. The aim of this study was to examine the influences of 0.6 wt% boron on the microstructure and LPS behavior of boron-alloyed 410 martensitic stainless steel. The results showed that adding 0.6 wt% boron can obviously promote the LPS due to a eutectic reaction and increase the sintered density of 410 stainless steel. The density was much increased by 1.06 g/cm³ after 1225°C sintering. Increasing the sintering temperature from 1225°C to 1275°C did not obviously improve the sintered density. After sintering at 1225°C~1275°C, the matrix was fully martensitic, and intragranular borides were extensively found due to the solidification of eutectic liquid. The microstructure after LPS consisted of the martensitic matrix and (Fe, Cr)₂B boride, as identified by electron backscatter diffraction (EBSD) and electron probe micro-analysis (EPMA).

Keywords : powder metallurgy, liquid phase sintering, stainless steel, martensite, boron, microstructure

Conference Title : ICMMP 2017 : International Conference on Microstructure and Materials Properties

Conference Location : Tokyo, Japan

Conference Dates : November 13-14, 2017