

## Liquid Phase Sintering of Boron-Alloyed Powder Metallurgy Stainless Steel

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**Abstract :** Liquid phase sintering (LPS) is a feasible means for decreasing the porosity of powder metallurgy (PM) Fe-based material without substantially increase the production cost. The aim of this study was to investigate the effect of 0.6 wt% boron on the densification of PM 304L stainless steel by LPS. The results indicated that the increase in the sintered density of 304L+0.6B steel is obvious after 1250 °C sintering, and eutectic structures with borides are observed at the interfaces of the raw steel powders. Differential scanning calorimetry (DSC) results show that liquid is generated at 1244°C during sintering. The boride in the eutectic structure is rich in boron and chromium atoms and is deficient in nickel atoms, as identified by electron probe micro-analyzer (EPMA). Furthermore, the sintered densities of 304L and 304L+0.6B steels sintered at 1300 °C are 6.99 g/cm<sup>3</sup> and 7.69 g/cm<sup>3</sup>, respectively, indicating that boron is a suitable alloying element for facilitating LPS of PM 304L stainless steel.

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

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