Synthesis of Carbide-Aluminide Cermets

Kiyotaka Matsuura, Yusuke Hikichi, Yuki Obara, Tatsuya Ohmi and Masayuki Kudoh

Hokkaido University, Kita 13 Nishi 8, Sapporo, Hokkaido 060-8628, Japan

ABSTRACT

TiC-FeAl and TiB$_2$-FeAl composites have been combustion synthesized from mixtures of the elemental powders of titanium, carbon, aluminum, iron, and boron. When the powder mixtures were heated in an argon atmosphere to approximately 950 K, an abrupt increase in temperature occurred, indicating that the combustion synthesis reactions occurred in the powder mixture. The metallographic investigations and chemical analyses revealed that TiC particle dispersed FeAl alloys and TiB$_2$ particle dispersed FeAl alloys were produced. As the volume fractions of the TiC particles and TiB$_2$ particles increased, the Vickers hardness of the sample increased dramatically. The TiB$_2$ particle dispersion was more effective at increasing the hardness of the sample.