

# A Study of Binder Phase in TiC-(Fe+Al) Cermet

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## 1. Introduction

The composites of iron-aluminum intermetallics and carbides are interested in one of wear resistant materials. The mechanical properties of the composite are depended on the volume fractions of each component. To improve the wear resistant property, the amount of the carbide is increased, but the material would be brittle. The powder metallurgy is one of the most potential methods.

In this study, FeAl-TiC cermet was considered as one of the wear resistant materials. The microstructures and mechanical properties were observed in relation to TiC content in the alloys.

## 2. Experimental Procedure

The raw materials were the powders of carbonyl iron (MACRO Co., 5~6 $\mu$ m), aluminum (Chang-Sung Co., -325 mesh), and titanium carbide (DRAFT CO., 0.8~2.0 $\mu$ m). These powders with ethanol were mixed in Planetary Mill (FRITSCH, P-5). The alloy compositions were 100vol%(Fe+Al), 80vol%(Fe+Al)-20vol%TiC, 70vol%(Fe+Al)-30vol%TiC, and 60vol%(Fe+Al)-40vol%TiC. The condition of mixing was 3 hours with 150 rpm. After milling, the mixed powders were dried and pressed in the mold with 100 MPa.

These compacts were sintered in vacuum furnace from 1150 $^{\circ}$ C to 1300 $^{\circ}$ C for one hour and in tube furnace with Ar or N<sub>2</sub> gas atmosphere. After sintering, the microstructure, relative density and hardness on each specimen were observed. The phase changes in the alloys were examined by X-ray Diffractometer (Rigaku Co., DMAX-2500) and SEM(JEOL Co., JSM-6330F).

## 3. Reference

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- [2] M. Angiolini, F. Cardellini, M. Krasnowski, G. Mazzone, A. Montone, M. Vittori-Antisari, Microsc. Microanal. Microstruct. 6 (1995) 601.