

## EFFECT OF ALLOYING ON THE MICROSTRUCTURE AND MECHANICAL PROPERTIES OF Mo-Fe-B BORIDE HARD ALLOYS

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Hard alloys based on ternary borides ( $\text{Mo}_2\text{FeB}_2$  and  $\text{Mo}_2\text{NiB}_2$ ) are potential candidates for partial substitution of hard alloys based on tungsten carbide in the industry. These hard alloys (cermets) have excellent combination of hardness, toughness, corrosion resistance, and a coefficient of thermal expansion close to steel [1, 2].  $\text{Mo}_2\text{FeB}_2$  based cermets attract much attention because of cheap raw material and simple preparation method. This method is known as boronizing sintering and associated with formation of ternary boride cermets in metal matrix during liquid phase sintering [3]. Generation of liquid phase makes it possible to reduce the reacting temperature and consequently reduce temperature of the cermets production.

The purpose of this investigation is to determine the effect of Ni, Cr and C addition on the microstructure, phase composition and mechanical properties of  $\text{Mo}_2\text{FeB}_2$  based hard alloys.

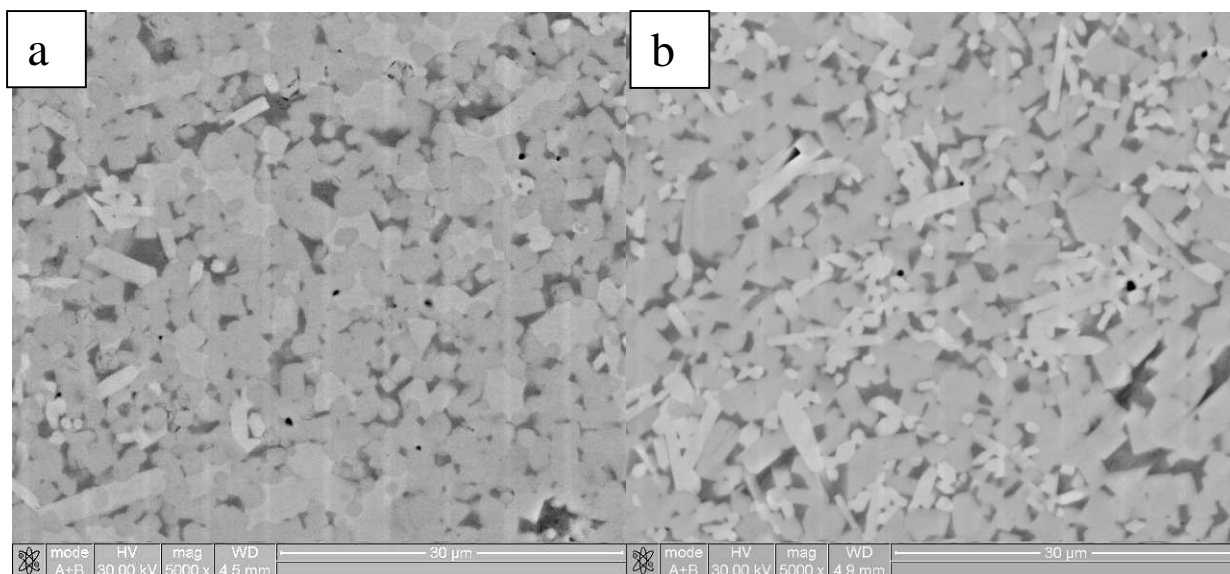


Fig. 1. Microstructure of the cermets with nickel contents of: (a) 0 wt.%; (b) 0.5 wt.%;

The results reveal that alloying of cermet with small amount of nickel leads to the transformation of binder phase from ferrite to austenite. With the increase of Ni content two types of ternary borides  $\text{Mo}_2\text{FeB}_2$  and  $\text{Mo}_2\text{NiB}_2$  can be formed (Fig.1).

Chromium addition changes the shape of the boride from closed angle to equiaxial structure and leads to grain refinement of borides. The hardness increased with the increasing of Cr concentration.

Doping with carbon of cermets alloyed by chromium is accompanied by  $\text{M}_6\text{C}$  and  $\text{M}_{23}\text{C}_6$  carbides formation and reduction of binder phase volume fraction. These factors lead to an increase in hardness and a decrease in crack resistance in cermets with high carbon content.

### REFERENCES

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