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Processing and microstructural characterization of WC-Co cermets doped by ZrO₂.

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Abstract.

WC-Co hardmetals are extremely important materials in engineering applications from cutting tools through dies and press moulds to teeth on gravel extractors. However, shortage of tungsten and cobalt and relatively low fracture toughness of these materials represent some obstacles in their general use.

The toughest ceramics known are based on zirconium dioxide ones the promising properties of which are attributed to the stress induced phase transformation from tetragonal to monoclinic structures. Adding of ZrO₂ is expected to increase fracture toughness without loss in hardness.

At the present work we report the processing of the WC – Co – ZrO₂ cermets with the oxide addition of 6 wt% through the conventional powder metallurgy as well as sinter/HIP routines during different times of the sintering and/or temperatures.

Microstructural characterization of the initial powders and final products has been conducted with the help of XRD-analysis and scanning electron microscopy combined with energy dispersive spectroscopy.

Influence of the milling and sintering process parameters on the developed microstructure is discussed in details.