

## The Functionally Graded Cermets Prepared by Hip in Nitron

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### Abstract

Ti(C, N)-based cermet was subjected to a heat-treatment in nitrogen at different temperatures. The microstructures were characterized using X-ray diffraction (XRD), scanning electron microscopy (SEM), electron microprobe analysis (EMPA), transmission electron microscopy (TEM) and energy dispersive X-ray analysis (EDX). It was found that the heat-treatment in nitrogen introduced about 20um surface zone enriched in nitrogen and titanium. Tungsten carbide and molybdenum carbide were observed in the surface zone. During the heat-treatment, an irregularly shaped nitrogen-rich phase has reprecipitated from the binder phase and grown on the Ti(C, N) cores or the outer rim phase. With the increase of the heat-treated temperature, the tungsten carbide and molybdenum carbide in the surface zone decreased; part of the rim was dissolved in the binder. When the cermets were treated at 1250°C, a gradient zone rich in binder was induced just below the harden surface. So the cermet was densified to obtain a surface hardness of 1833.45HV by heat-treated under 100Mpa in nitrogen at 1250°C for 4h.

**Key words :** Ti(C, N)-based cermets; heat-treatment in nitrogen; microstructure; properties