

Addition of nano-Al₂O₃ effects on microstructures and properties of WC-8Co composites

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Abstract: To investigate the role of nano-Al₂O₃, WC–Al₂O₃–8wt%Co hard metals was mixed with 0-1.2 wt% nano-Al₂O₃ and prepared by conventional sintering (CS) for 2 h at 1440°C to see whether the addition of Al₂O₃ could improve densification behaviour, the microstructure and mechanical properties of the samples. Experimental results showed that the use of Al₂O₃ nanoparticles as dispersions could reduce the porosity of WC-Co alloy and increase the relative density; it could also inhibit the growth of the grains of WC-Co hardmetal to enhance the hardness and transverse rupture strength of the alloy in a proper range. The influence of Al₂O₃ content on the magnetic properties including coercive force and saturated magnetic intensity of the WC–Al₂O₃–8wt%Co hardmetals manifested the additive of nano-Al₂O₃ have effect on the WC grain growth inhibition and the formation of decarbonization phase in the alloy.

Keywords: WC-Co; nano-Al₂O₃; Microstructure; Properties

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