

AN INVESTIGATION ON THE DIFFUSION BONDING ABILITY OF WC-Ni CERAMIC-METAL COMPOSITES

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ABSTRACT

In this study, the production of particle reinforced ceramic-metal composites and their diffusion bonding have been carried out. WC reinforcement particles were Ni plated by electroless technique. Two sets of specimens were prepared; first group of specimen was produced from WC and Ni powders which were separately used for sintering and second group of specimen were produced from WC powders which were Ni plated by electroless technique and then sintered. Specimens composed of 70wt% WC and 30 wt% Ni were sintered at temperature range 900 °C - 1300 °C under Ar atmosphere. An attempt to diffusion bond of specimens sintered at 1200 °C were successful at 1170 °C under Ar atmosphere. Average hardness values were found to be 259HV and 346HV for first and second group of specimens, respectively, that were determined by taking measurement from 15 different points. Hardness measurements showed that the hardness value increases as the distance to bond line decreases. In addition, it was shown that the hardness values for the specimens produced from electroless Ni plated WC powders have higher hardness values compared to other set of specimens. The bondline of diffusion bonded specimens were examined using optical and Scanning Electron Microscope.

Key Words : Electroless plating, Ceramic-Metal Composite, Powder metalurgy, diffusion bonding