Synthesis of MMCs Cu/Al$_2$O$_3$ by Powder Metallurgy Processes with Variation of Volume Fraction Al$_2$O$_3$ and Sintering Temperature

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ABSTRACT

Cu in the defense industry plays a very important particularly for the manufacture of bullets. The weakness is porosity is difficult to control and this is a ductile material but a little more rigid like ceramic Al$_2$O$_3$ in order to be produced materials with high tenacity and hard, like ceramic Al$_2$O$_3$.

Composite Cu/ Al$_2$O$_3$ is a combination of matrix Cu and Al$_2$O$_3$ as reinforcement. Composite Cu/Al$_2$O$_3$ is done by powder metallurgy process that can be controlled the accuracy and precision of the process. Composite through controlled matrix-reinforcement that the reinforcement Al$_2$O$_3$ is variated by 10, 20, 30 and 40% and the sintering temperature veriated 600, 700 and 800$^\circ$C

The result from compaction test of the fraction volume of reinforcement and the sintering temperature that give the highest young modulus of reinforcement is the 2% fraction volume of Al$_2$O$_3$ and 800$^\circ$C sintering temperature, where the young modulus is $E = 334609.7$ Mpa. So the Cu/ Al$_2$O$_3$ composite can be used as shell material.

Keywords: Cu- Al$_2$O$_3$, volume fraction, sintering temperature, young modulus.