

Mechanical Performance Evaluation of Al₂O₃–ZrO₂–Ti Composite Materials

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ABSTRACT:

The applications of ceramic based materials is becoming a trend due to their important mechanical and microstructural properties. This work evaluates the mechanical properties of ceramics composite of Al₂O₃–ZrO₂ reinforced with Titanium (Ti) particles. The material is known for the application of biomedical devices due to the optimized functional properties. The mechanical properties of Al₂O₃–ZrO₂ composites can be enhanced by incorporating Ti. To measure the mechanical properties, standard size samples of the ceramic composites were fabricated through powder processing method to consolidate the powders. A varying composition of Ti ranging from 5–45% by volume was used. Then, the measurements were conducted on each sample to determine the physical and mechanical performance of the composite. As a result, the newly produced composite materials with 75 vol.% Al₂O₃ + 10 vol.% ZrO₂ + 15 vol.% Ti showed better physical and mechanical properties than the other compositions based on the requirements in the biomedical applications.

KEYWORDS:

Alumina; Zirconia; Titanium; Powder metallurgy; Flexural strength; Density; Ceramics

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