

Mechanical Characterization and Metallography of Sintered Aluminium-Titanium Diboride Metal Matrix Composite

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Abstract : The industrial applicability of aluminium metal matrix composites (AMMCs) has been rapidly growing due to their exceptional materials traits such as low weight, high strength, excellent thermal performance, and corrosion resistance. The increasing demand for AMMCs in automobile, aviation, aerospace and defence ventures has opened up windows of opportunity for the development of processing methods that facilitate low-cost production of AMMCs with superior properties. In the present work, owing to its economy, efficiency, and suitability, powder metallurgy (P/M) technique was employed to develop AMMCs with pure aluminium as matrix material and titanium diboride (TiB_2) as reinforcement. AMMC samples with different weight compositions (Al-0.1% TiB_2 , Al-5% TiB_2 , Al-10% TiB_2 , and Al-15% TiB_2) were prepared through hot press compacting followed by traditional sintering. The developed AMMC was subjected to metallographic studies and mechanical characterization. Experimental evidences show significant improvement in mechanical properties such as tensile strength, hardness with increasing reinforcement content. The current study demonstrates the superiority of AMMCs over conventional metals and alloys and the results obtained may be of immense in material selection for different structural applications.

Keywords : AMMCs, mechanical characterization, powder metallurgy, TiB_2

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