

Synthesis and Characterization of Aluminum Matrix Composites Reinforced with Various Ratio of TiC for Light Devices

Abstract

Powder metallurgy technique has been used to fabricate aluminum matrix composites reinforced by different weight ratios (Al-5, 15 and 25 wt. % TiC composites Al) to study the effect of different weight fractions on microstructure, mechanical, and electrical properties of the Al-TiC composites. The green compacts of Al-TiC composites were sintered for 3 hours at 500, 550, and 600 °C. Hardness test, wear test, and electrical conductivity test were carried out on the Al-TiC composites. SEM techniques were used for microstructure examination of the Al-TiC composites. The presences of TiC particulates as reinforcement lead to a simultaneous increase in hardness and wear resistance of the composites. On the contrary, the electrical conductivity decreases marginally with increasing weight fraction of the TiC reinforcement in the aluminum matrix. Al-25wt. % TiC composites with 600°C sintering temperature exhibited the best properties with microhardness value (63.7 Hv); wear rate (0.043 mm³/s). Al-5wt. % TiC composites with 600°C sintering temperature exhibited the higher electrical conductivity value [0.285×10⁷ (Ω-m)⁻¹].

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