Pengaruh penambahan sic terhadap karakteristik komposit al 11zn 6 7mg hasil squeeze casting untuk aplikasi balistik = Effect of sic addition to the characteristics of composite al 11zn 6 7mg by squeeze casting for ballistic application

Rafly Fajar Adiputra, author

Abstrak

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Dalam pengembangannya untuk mereduksi berat kendaraan dan mempertahankan sifat mekanis, dipilih material komposit aluminium sebagai pengganti baja sebagai penyusun utama badan kendaraan taktis. Penelitian ini bertujuan mengembangkan komposit bermatriks Al-11Zn-6,7Mg dengan variasi kadar penguat SiC sebanyak 0, 10, dan 15 vol.% yang dibuat dengan metode squeeze casting. Karakterisasi yang dilakukan pada komposit ini adalah pengujian komposisi kimia, pengamatan struktur mikro dan Scanning Electron Microscope ? Energy Dispersive Spectroscopy (SEM-EDS), pengujian kekerasan, pengujian impak , dan pengujian balistik tipe III sesuai standar NIJ. Hasil pengujian menunjukkan seiring bertambahnya kadar penguat SiC sebanyak 0, 10, dan 15 vol.% menyebabkan nilai kekerasan pelat komposit meningkat yakni 73 HRB, 85 HRB, 87 HRB dan menunjukkan penurunan harga impak menjadi 12.278,69 J/m2, 11.290,35 J/m2, dan 9.924,54 J/m2. Pada pengamatan SEM-EDS menunjukkan adanya fasa intermetalik Mg3Zn3Al2 yang tebentuk selama solidifikasi, dan indikasi terbentuknya presipitat MgZn2 akibat proses pengerasan penuaan. Komposit bermatriks aluminium dengan penguat SiC dengan kadar 15 vol.% sangat potensial untuk menahan penetrasi dari peluru tipe III (7,62 mm).
ABSTRACT
The alternative materials are seek as the substitute for steel to increase the mobility and reduce the fuel consumption of the tactical vehicles, and one candidate for this is aluminium composite. This research aimed ro develop composites with the matrix of Al-11Zn-6.7Mg and SiC strengthening particles with the fraction of 0, 10, and 15 vol.% were fabricated through squeeze casting process. The characterization of the samples included chemical composition test, observation of microstructure, Scanning Electron Microscope ? Energy Dispersive Spectroscopy (SEM-EDS), hardness test, impact test, and type III ballistic test in accordance with NIJ standard. The results showed that the increase in SiC, increased the hardness from 73 HRB to 85 HRB and 87 HRB, respectively, while on the other hand reduced the impact values from 12.278,69 J/m2 to 11.290,35 J/m2 and 9.924,54 J/m2. The SEM-EDS showed the presence of Mg3Zn3Al2 intermetallic, which formed during solidification, and indicated the precipitation of MgZn2 precipitates during ageing. The ballistic testing demonstrated a promising result of the potential of Al-11Zn-6.7Mg composite strengthened by 15 vol.% SIC to withstand penetration of type III bullet (7.62 mm).
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