

Studi pengaruh penambahan penguat zro2 terhadap karakteristik komposit al-13, 1zn-6, 1mg-6, 7si-1, 4cu hasil squeeze casting untuk aplikasi balistik = The effect of zro2 reinforcement addition to the characteristics of al-13, 1zn-6, 1mg-6, 7si-1, 4cu composite with squeeze casting process for ballistic application

Rio Kharizma Agrista, author

Deskripsi Lengkap: <https://lib.ui.ac.id/detail?id=20368735&lokasi=lokal>

Abstrak

ABSTRAK

Badan pelindung kendaraan militer umumnya terbuat dari baja. Tetapi densitasnya yang sangat tinggi memicu diadakannya pengembangan berupa penggantian material penyusun dari baja menjadi aluminium komposit, agar kendaraan militer tersebut menjadi lebih ringan dengan tetap memiliki sifat mekanis yang baik. Penelitian ini menggunakan komposit dengan matriks Al-13,1Zn-6,1Mg-6,7Si-1,4Cu dengan variasi kadar penguat ZrO₂ sebanyak 5, 7,5 dan 10 vol.% yang difabrikasi menggunakan metode squeeze casting. ZrO₂ dipilih karena ketangguhannya yang relatif tinggi dibandingkan dengan unsur keramik lain, yang diharapkan dapat meningkatkan ketahanan balistik dari komposit. Dilakukan beberapa karakterisasi pada komposit, diantaranya adalah pengujian komposisi kimia menggunakan OES, pengujian kekerasan menggunakan metode Rockwell B, pengujian impak menggunakan metode charpy, pengamatan struktur mikro menggunakan mikroskop optik dan SEM-EDX, perhitungan presentase porositas menggunakan metalografi kuantitatif, dan pengujian balistik tipe III. Hasil pengujian menunjukkan dengan variasi penambahan kadar ZrO₂ sebanyak 5,7,5 dan 10 vol.%, persentase porositas pada komposit mengalami kenaikan yang menyebabkan menurunnya sifat mekanik dari komposit, diantaranya adalah nilai kekerasan dan harga impak. Hasil analisa dengan SEM-EDX menunjukkan terbentuknya cluster ZrO₂ disekitar pori. Hal ini membuktikan bahwa ZrO₂ merupakan inisiatör dari pembentukan pori. Hasil pengujian balistik menunjukkan bahwa aluminium komposit dengan penguat ZrO₂ sudah mampu untuk menahan penetrasi peluru pada pengujian balistik tipe III.

<hr>

ABSTRACT

The armor of military vehicle are usually made from steel. But because of the high density that steel have the development of the armor which is the substitution of material to aluminum composite is being conducted so that the vehicle could have become lighter and still have the properties needed. The armor of military vehicle are usually made from steel. But, because of the high density that steel have, the development of the armor, which is the substitution of material to aluminum composite is being conducted, so that the vehicle could have become lighter and still have the properties needed. This project used composite with Al-13,1Zn-6,1Mg-6,7Si-1,4Cu as matrix, and ZrO₂ with 5, 7,5 and 10 vol.% variation as reinforcement that fabricated with squeeze casting method. ZrO₂ was chosen because of relatively high toughness that it has among other ceramic elements, that was hoped to increase the resistance to ballistic application. To evaluate the effect of ZrO₂ addition, some material characterization is needed, such as chemical composition, hardness, and impact testing, microstructure analysis, calculation of porosity precentage, and ballistic type III testing. The result of the tests show that the addition of ZrO₂ with 5, 7,5 and 10 vol.% variation increase the precentage

of porosity that caused the composite to have lower mechanical properties value. The result of microstructure analysis with SEM- EDX shows that ZrO₂ formed a cluster around the pores. That fact has proven the analysis of ZrO₂ as pores initiator. Ballistic testing shows that aluminum composite with ZrO₂ reinforcement can withstand the bullet penetration of ballistic testing type III."his project used composite with Al 13 1Zn 6 1Mg 6 7Si 1 4Cu as matrix and ZrO₂ with 5 7 5 and 10 vol variation as reinforcement that fabricated with squeeze casting method ZrO₂ was chosen because of relatively high toughness that it has among other ceramic elements that was hoped to increase the resistance to ballistic application To evaluate the effect of ZrO₂ addition some material characterization is needed such as chemical composition hardness and impact testing microstructure analysis calculation of porosity precentage and ballistic type III testing The result of the tests show that the addition of ZrO₂ with 5 7 5 and 10 vol variation increase the precentage of porosity that caused the composite to have lower mechanical properties value The result of microstructure analysis with SEM EDX shows that ZrO₂ formed a cluster around the pores That fact has proven the analysis of ZrO₂ as pores initiator Ballistic testing shows that aluminum composite with ZrO₂ reinforcement can withstand the bullet penetration of ballistic testing type III.