Pembentukan komposit matriks Al-4%Cu-4%Mg berpenguat 5% vf dan 10% vf Al2O3 melalui proses thixoforming = Fabrication of composite matrix Al-4%Cu-4%Mg with 5%vf and 10% vf Al2o3 reinforcement by thixoforming process

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Abstrak

Komposit matriks logam sedang dikembangkan sebagai pengganti baja pada kendaraan bermotor untuk efisiensi penggunaan bahan bakar. Komposit Al-4%Cu-4%Mg berpenguat Al2O3 memiliki potensi untuk ditingkatkan sifat mekaniknya dengan pembentukan semi padat thixoforming. Pada penelitian ini, persentase fraksi volume Al2O3 sebesar 5% dan 10% difabrikasi dengan metode as cast dan thixoforming untuk mengetahui efek penambahan kadar Al2O3 dan struktur mikro hasil thixoforming dengan as cast. Hasil penelitian menunjukkan kekerasan dan ketahanan aus meningkat seiring penambahan Al2O3. Porositas komposit turut meningkat dengan penambahan Al2O3 sehingga densitas komposit menurun. Pengamatan struktur mikro menunjukkan komposit as cast memiliki struktur dendritik sedangkan komposit hasil thixoforming memiliki struktur globular. Struktur globular memiliki sifat yang lebih baik dibandingkan struktur dendritik dimana komposit hasil thixoforming memiliki nilai kekerasan dan ketahanan aus yang lebih tinggi dibandingkan dengan komposit as cast.

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Aluminum matrix composite has been widely developed as a replacement of steel which being used in vehicle for fuel eficiency. Composite Al-4%Cu-4%Mg with Al2O3 reinforcement has potential to increase its mechanical properties with thixoforming process. In this study, aluminum composite with 5% and 10% volume fraction of Al2O3 were fabricated by as cast and thixoforming process to determine the effect of Al2O3 addition and microstructure of as cast compared with thixoforming composite. The results show that hardness and wear resistance increased with Al2O3 addition. Porosity also increased with Al2O3 addition so the density of composite decreased. Microstructure observation shows that as cast composite has dendritic microstructure while thixoformed composite has globular microstructure. Globular microstructure has better characteristic than dendritic microstructure that the hardness and wear resistance of thixoformed composite is higher than as cast composite