

Accepted Manuscript

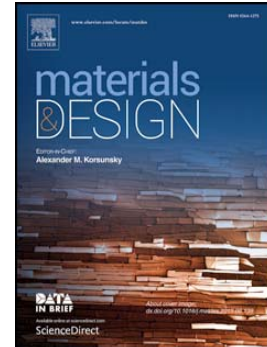
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PII: S0264-1275(15)30775-9
DOI: doi: [10.1016/j.matdes.2015.11.033](https://doi.org/10.1016/j.matdes.2015.11.033)
Reference: JMADE 936

To appear in:

Received date: 31 August 2015
Revised date: 23 October 2015
Accepted date: 9 November 2015



Please cite this article as: Wenlong Zhang, Dongyan Ding, Ping Gao, High volume fraction Si particle-reinforced aluminium matrix composites fabricated by a filtration squeeze casting route, (2015), doi: [10.1016/j.matdes.2015.11.033](https://doi.org/10.1016/j.matdes.2015.11.033)

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**High volume fraction Si particle-reinforced aluminum matrix composites fabricated by
a filtration squeeze casting route**

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Abstract

A new method called filtration squeeze casting (FSC) was presented to fabricate high volume fraction Si particle-reinforced aluminum matrix composites (Si_p/Al) for electronic packaging applications. The Si_p/Al composites exhibited a CTE of ~ 8.70 ppm/K, a TC above 119.80 W/m.K and a density of ~ 2.47 g/cm³ as well as a flexural strength above 163 MPa. Fracture of large Si particles occurred during FSC, resulting in a decreased size of Si particles and hence an increased mechanical property and a decreased TC. The average size of Si particles of $\sim 29\mu\text{m}$ is much smaller than that of the conventional hypereutectic Al-Si alloy but slightly larger than that of Si_p/Al composites fabricated by spray deposition, resulting in balanced mechanical and physical properties. Dilution treatment decreased the amount of eutectic silicon in the matrix, leading to a considerable increase in TC and a negligible decrease in flexural strength and hardness. The flexural fracture mode is as follows. First, when the load borne by a silicon particle is beyond its fracture strength, it breaks. Then, the

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