

Influence of Silicon Carbide Particle Size and Thermo-Mechanical Processing on Dimensional Stability of Al 2124SiC Nanocomposite

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Abstract : This study is to investigation the effect of silicon carbide (SiC) particle size and thermo-mechanical processing on dimensional stability of aluminum alloy 2124. Three combinations of SiC weight fractions are investigated, 2.5, 5, and 10 wt. % with different SiC particle sizes (25 μm , 5 μm , and 100nm) were produced using mechanical ball mill. The standard testing samples were fabricated using powder metallurgy technique. Both samples, prior and after extrusion, were heated from room temperature up to 400°C in a dilatometer at different heating rates, that is, 10, 20, and 40°C/min. The analysis showed that for all materials, there was an increase in length change as temperature increased and the temperature sensitivity of aluminum alloy decreased in the presence of both micro and nano-sized silicon carbide. For all conditions, nanocomposites showed better dimensional stability compared to conventional Al 2124/SiC composites. The after extrusion samples showed better thermal stability and less temperature sensitivity for the aluminum alloy for both micro and nano-sized silicon carbide.

Keywords : aluminum 2124 metal matrix composite, SiC nano-sized reinforcements, powder metallurgy, extrusion mechanical ball mill, dimensional stability

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