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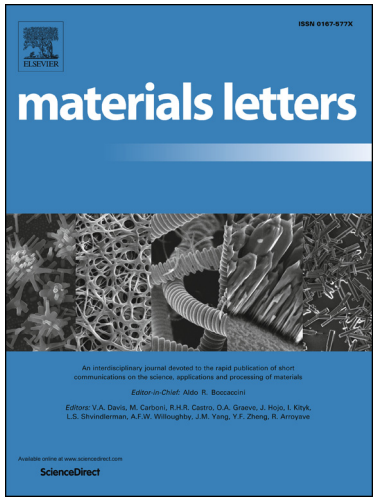

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Direct metal deposition of TiB_2/AlSi10Mg composites using satellited powders

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Abstract: Deployment of Al components produced by Additive Manufacturing (AM) is inhibited by the low strength of the casting Al alloys currently being repurposed for use with this process. As a result, the use of AM to produce Al matrix Composites (AMCs) which have superior properties to their castable counterparts is an emerging area of research. In this paper, micro TiB_2 particles were decorated to the surface of larger AlSi10Mg powder particles to create feedstocks through the 'satelliting' method. TiB_2/AlSi10Mg composites were then successfully fabricated by Direct Metal Deposition (DMD) with a uniform distribution of the reinforcing TiB_2 particles observed. Results show that macro agglomerations of TiB_2 particles decrease significantly with decreasing traverse speed and TiB_2 content. Porosity is also shown to decrease markedly with increasing traverse speed for this material feedstock. The hardness of deposits is shown to increase with addition of TiB_2 content, which implies improvement of material strength.

Keywords: Additive manufacturing; Direct metal deposition; Aluminium alloys; AlSi10Mg; TiB_2; Metal matrix composites

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