

Accepted Manuscript

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PII: S1359-8368(18)30951-X

DOI: [10.1016/j.compositesb.2018.05.055](https://doi.org/10.1016/j.compositesb.2018.05.055)

Reference: JCOMB 5725

To appear in: *Composites Part B*

Received Date: 24 March 2018

Revised Date: 17 May 2018

Accepted Date: 29 May 2018

Please cite this article as: Sun J, Fu Q-G, Huo C-X, Li T, Fracture toughness of thermally sprayed MoSi₂ composite with different melting indices, *Composites Part B* (2018), doi: 10.1016/j.compositesb.2018.05.055.

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Fracture toughness of thermally sprayed MoSi₂ composite with different melting indices

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Abstract Whether the *in-situ* multiphase doping, especially the metastable phase, makes the thermally sprayed materials tough or brittle is still unknown. In this sense, plasma sprayed MoSi₂ composite was accordingly fabricated to investigate the effect of *in-situ* multiphase doping on the fracture toughness by melting index (M.I.) tuning. The fracture toughness of plasma sprayed MoSi₂ composite was improved with M.I. increasing. The maximum fracture toughness can reach to 5.64 MPa·m^{1/2} at a M.I. of 0.59, which was the highest among currently reported single-phase-derived thermally sprayed MoSi₂ composites. A large number of metastable β generated in plasma sprayed MoSi₂ composite were responsible for such remarkable improvement. The fracture toughness of the plasma sprayed MoSi₂ composite, however, would decline as M.I. value exceeded 0.59. Over-heating derived crystallization, which decreased the positive effect of β , caused the fracture toughness deterioration.

Keywords

A. Intermetallics; B. Fracture toughness; B. Microstructures; C. Analytical modelling

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