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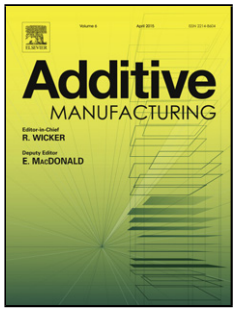

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Behavior of yttria-stabilized zirconia (YSZ) during Laser Direct Energy Deposition of an Inconel 625-YSZ Cermet

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Abstract

Thermal barrier coatings (TBC) are regularly used today to protect and extend the service life of several superalloys which are extensively used in high temperature applications. The existing TBCs are typically between 0.1 to 0.5 mm in thickness, are deposited on metal substrates using plasma spray or electron beam vapor deposition, and can reduce temperatures at the substrate surface by up to 300 °C. For greater temperature reductions there is a need for thicker TBCs. The building of thick TBCs has to date been stymied by poor adhesion, and cracking during deposition. It has been suggested that a functionally graded approach may reduce the residual stresses which result in these defects. To date there have been few reports on the deposition of ceramic or cermet coatings using laser AM and none have reported on the phase stability of