Article

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Abstract

A transient three dimensional model for describing the temperature behavior, thermo-capillary convection, microstructure evolution and the resultant mechanical properties during selective laser melting of AlN/AlSi10Mg composite is proposed. The powder-solid transformation, temperature dependent physical properties and the preservation of the heat are taken into account. The effect of the additive manufacturing multilayer feature on the molten pool dynamics, cooling rate, crystal size, microstructure morphology, micro-hardness and types of the residual stress has been investigated. It shows that the operating temperature and the thermo-capillary convection obtained within the molten pool generally increases as the processing