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Effect of post-process heat treatment on microstructure and properties of selective laser melted AlSi10Mg alloy

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Abstract: In the present work, the model alloy of AlSi10Mg was prepared by selective laser melting, and further annealed by two kinds of heat treatment regimes, i.e. A1 (300°C/2h + water quench) and A2 (535°C/1h + water quench + 190°C/10h + furnace quench). The samples were investigated by XRD, SEM, EBSD, room temperature tensile and nanoindentation tests, to understand the effect of heat treatments on the phase constituents, microstructure, residual stress and mechanical properties of the laser additive manufactured AlSi10Mg alloy. The experimental results showed that, the heat treatment method of A1 is an effective heat treatment regime for eliminating the residual stress and improving the comprehensive mechanical properties for structural applications.

Key words: Selective laser melting; Metals and alloys; AlSi10Mg; Residual stress; X-ray techniques; Mechanical properties

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