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A novel approach to in-situ fabricate Ti-6Al-4V alloy with graded microstructure and property by selective laser melting

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Abstract: Relationship of processing with microstructure in Ti-6Al-4V single-layer and single-track wall samples was investigated under various thermal cycles of selective laser melting (SLM). The microstructure is controlled by peak temperature (T_P) and times of thermal cycles depending on SLM processing parameters. The refinement of α' occurs during vertical thermal cycles of $T_P >$ liquid temperature (T_L) and is enhanced with thermal cycle times. No obvious microstructural evolution is exhibited during thermal cycles of $T_P < T_L$. A novel approach to in-situ fabricate Ti-6Al-4V alloy with graded microstructure and nanohardness is successfully developed by governing the process and parameters of SLM.

Keywords: Selective laser melting; Titanium alloy; Thermal cycles; Graded microstructure

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