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<u>PROCEEDINGS</u>

Development of a High-Temperature Resistance SLS Sand Mold Process for Titanium Alloy Casting

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ABSTRACT

3D printing sand mold has been widely used in casting production. However, there exist some problems hindering its application for titanium alloy casting, such as the large amount of gas evolution, cannot withstand high temperature impact, easy to react with titanium alloy melt, etc. This work develops a high-temperature resistance SLS (selective laser sintering) sand mold process by introducing inorganic binder in two different ways, i.e., bi-binder SLS process and SLS infiltration process. After sintering at 1100 ℃, SLS sand mold or core possesses high tensile strength and can be used for titanium alloy casting. The high-temperature strengthening mechanism of sand mold was discussed. High precision of SLS sand mold can be obtained by revealing the dimension deviation and transfer law of CAD model, SLS sand mold and sintered SLS sand mold. This study provides the theoretical basis for preparing sand mold or core with high inertia and dimensional accuracy, which can be used to produce complex titanium alloy castings.

KEYWORDS

SLS sand mold; titanium alloy castings; high-temperature strengthening; inorganic binder

Conflicts of Interest: The authors declare that they have no conflicts of interest to report regarding the present study.