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Additive manufacturing of special alloys with high niobium content for aerospace applications.

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Metallic materials are fundamental to aircraft turbine components and space thrusters. This work explores the alterations in the microstructure and mechanical properties additively manufactured niobium-enhanced refractory alloys following aging heat treatment. The FS85 and C103 alloy powder feedstock was used to produce test coupons using laser powder bed fusion technique. Evaluation of the microstructural changes was performed through optical microscopy combined with scanning electron microscopy. In addition, hardness tests were carried out to study the response of mechanical properties to different aging heat treatments applied. The evolution of intragranular and grain-boundary precipitation as a function of aging temperature was followed. It was found that a significant precipitate coarsening was observed with increased aging temperature and both intragranular precipitates and particles along the grain boundaries have affected the mechanical properties of the aged materials.