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Correlation between microstructure and mechanical properties in a novel niobium-aided maraging steel.

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Maraging steels find widespread use across various industries, from power generation to aerospace. However, there is a continuous need for testing and analyzing improvements to enhance specific properties such as toughness or yield strength. One approach to achieve such improvements is by altering the chemical composition. In this study, a thorough microstructural characterization of a novel Nb-aided maraging steel was conducted. A correlation between the microstructural constituents present and resulting mechanical properties was established. Inclusions of titanium or niobium were identified in the materials in their as-received state. Subsequently, precipitates containing niobium and molybdenum formed after solubilization of the modified alloys. These precipitates played a crucial role in altering the mechanical properties, as evidenced by the impact test fracture surfaces. Following the aging treatment, all analyzed materials exhibited improved resistance properties.