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Niobium Alloys for the Chemical Process Industry

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Abstract

Tantalum materials have been used extensively in some of the most demanding applications in the chemical process industry (CPI) for many years. However, tantalum and tantalum alloys are not only expensive relative to other corrosion resistant metals such as zirconium, but can be considered excessive for many less demanding applications. Niobium is used on a limited basis in the CPI due to its low mechanical strength and poor corrosion resistance relative to tantalum and zirconium. Consequently H.C. Starck undertook a project to develop new niobium alloys with improved corrosion resistance as well as improved mechanical properties. Initial results have shown these niobium alloys have corrosion resistance significantly improved over pure niobium and zirconium with mechanical properties comparable to Ta-3W, the standard tantalum based CPI alloy.

Keywords

tantalum, niobium, molybdenum, tungsten, ruthenium, palladium, alloy, melting, thermomechanical, corrosion, hydrogen, embrittlement, mechanical properties, modeling