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Synthesis and structural characterization of nanocrystalline Ti-Al intermetallic compound prepared by mechanical alloying

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Intermetallic alloys are a class of structural materials for a variety of applications: space, automotive, aerospace etc. These compounds alloys based on Ti-Al are considered very promising for high temperature applications. They are compared with conventional alloys several advantages: higher modulus, lower density, better mechanical strength and greater resistance to oxidation. These alloys also retain good dimensional stability and greater thermal conductivity. However, their low ductility at an ambient temperature has been the major limitation for the use of these materials. The improvement of these properties is possible by developing new microstructures: Amorphous, nanostructure, quasicrystalline and nanostructures by addition of a third element. In this study we developed and studied, a base intermetallic alloys Ti-Al to which we added the Tantalum (Ta) element with the aim of producing nanostructured intermetallic alloys from elemental powders by means of mechanical alloying (MA). The phase evolution and microstructural changes of the powders during mechanical alloying were investigated as a function of milling time, by means of X-ray diffraction (XRD), scanning electron microscopy (SEM), and energy dispersive Spectroscopy (EDS).

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