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Impact of carbon nanotubes in a CrFeMnNiTi alloy proposed as a potential candidate for stainless-steel substitution

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Highlights

- Graphite substitution by CNTs produced hardened alloys.
- CNTs addition induce a reduction of growth rate and porosity of sintered samples.
- The equiatomic composition can lead to the generation of superior materials.
- Coexistence of austenite and Ti-rich phases produced hardened samples.

Abstract

In the steel industry, the fabrication of sintered products includes the use of graphite as an alloying element and lubricant. This study explores the idea that a sintered alloy with increased properties can be produced substituting graphite by carbon nanotubes. Also, the microstructural characteristics of an equiatomic alloy CrFeMnNiTi were compared with an austenitic 321 stainless-steel; which at present, has a vital role in the food industry. Results showed that the equiatomic alloy was composed mainly by austenite and Ti-rich phases, growth rate and porosity

of samples were reduced with the graphite substitution. On this way, carbon nanotubes addition and modification of the chemical composition of the alloy represented viable routes to obtain new alloys with enhanced properties to replace conventional steels.

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Keywords

Carbon nanotubes; Hardness; Powder technology; Sintering

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