عنوان مقاله:

An Advanced Thermo-mechanical Process to Obtain Nano/Submicron Grain Sizes in A Metastable Austenitic Stainless Steel

محل انتشار:

دومین کنگره بین المللی علوم و فناوری نانو (سال: 1387)

تعداد صفحات اصل مقاله: 2

نویسندگان:

A Hedayati, - *Department of Materials, Isfahan University of Technology, P. O. Box ۸۴۱۵۶ Isfahan*

F Forouzan

A Najafizade - *Department of Materials, Faculty of Materials, Isfahan University of Technology, P. O. Box ۸۴۱۵۶*

A Kermanpour

خلاصه مقاله:

Development of steels with high strength and good ductility is a target generally presented and, for instance, the European Steel Technology Platform has stated in its vision for the year 2030 a combination of tensile strength (Rm) of 1100 MPa with 35-50 % total elongation (among other combinations) to achieve in new generation steels for light-weight constructions, also including stainless steels [1]. Austenitic stainless steels have good corrosion resistance and good formability but they have also relative low yield strength. Among the different strengthening mechanisms, grain refinement is the only method to improve both strength and toughness simultaneously. Currently, laboratory techniques to produce ultrafine grained steels utilize two approaches: severe plastic deformation techniques or advanced thermo-mechanical processing, which essentially involves modification to conventional large scale steel rolling processes. Compared to severe plastic deformation techniques, advanced thermo-mechanical methods are large scale industrial processes and can be somewhat more readily optimized to operate in temperature regimes where they beneficially exploit phase transformation and controlled cooling [2].Austenite in stainless steels in general and the austenite in the 300 steels series in particular is not a stable phase. In the solution-treated condition, the Ms Temperature is normally below room temperature. The Md temperature, the temperature below which martensite will form under deformation, of the majority of those steels is above room temperature. Two kinds of martensite can occur in stainless steels: α' (bcc, ferromagnetic) and ε (hcp, non-ferromagnetic). The most frequent case of martensite formation at room temperature in stainless steels is that of strain induced martensite. The formation and the amount of α' and ε depend on the steel composition, on its stacking fault energy, and on the temperature, amount and rate of deformation [3].

کلمات کلیدی:

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