

Title (en)

METHOD FOR REINFORCING AN ALLOY BY PLASMA-NITRIDING

Title (de)

HERSTELLUNGSVERFAHREN EINER DURCH PLASMA-NITRIERUNG AUSSCHIEDUNGSGEHÄRTETEN LEGIERUNG

Title (fr)

PROCEDE DE FABRICATION D'UN ALLIAGE RENFORCE PAR NITRURATION PLASMA

Publication

**EP 2655684 A1 20131030 (FR)**

Application

**EP 11815535 A 20111222**

Priority

- FR 1061243 A 20101224
- FR 2011053175 W 20111222

Abstract (en)

[origin: WO2012085489A1] Process for manufacturing a reinforced alloy comprising a metallic matrix, dispersed in the volume of which are nanoparticles, at least 80% of which have a mean size from 1 nm to 50 nm, the nanoparticles comprising at least one nitride chosen from the nitrides of at least one metallic element M belonging to the group consisting of Ti, Zr, Hf and Ta. The process comprises the following successive steps: a) plasma nitriding of a base alloy is carried out at a temperature from 200°C to 700°C in order to insert interstitial nitrogen therein, the base alloy incorporating 0.1% to 1% by weight of the metallic element M and being chosen from an austenitic, ferritic, ferritic- martensitic or nickel-based alloy; b) the interstitial nitrogen is diffused within the base alloy at a temperature of 350°C to 650°C; and c) the nitride is precipitated at a temperature from 600°C to 900°C over a duration of 10 minutes to 10 hours, in order to form the nanoparticles dispersed in the reinforced alloy.

IPC 8 full level

**C22C 29/16** (2006.01); **C23C 8/24** (2006.01); **C23C 8/26** (2006.01); **C23C 8/36** (2006.01); **C23C 8/38** (2006.01)

CPC (source: EP KR US)

**B22F 3/14** (2013.01 - US); **C22C 29/16** (2013.01 - KR); **C22C 32/0068** (2013.01 - EP US); **C22C 33/0228** (2013.01 - EP US); **C23C 8/24** (2013.01 - EP US); **C23C 8/26** (2013.01 - EP KR US); **C23C 8/36** (2013.01 - EP US); **C23C 8/38** (2013.01 - EP KR US)

Citation (search report)

See references of WO 2012085489A1

Designated contracting state (EPC)

AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

DOCDB simple family (publication)

**WO 2012085489 A1 20120628**; CN 103282537 A 20130904; CN 103282537 B 20150603; EP 2655684 A1 20131030; EP 2655684 B1 20160302; ES 2572642 T3 20160601; FR 2969662 A1 20120629; FR 2969662 B1 20130628; JP 2014507557 A 20140327; JP 5878932 B2 20160308; KR 101506103 B1 20150325; KR 20140005213 A 20140114; RU 2013132869 A 20150127; RU 2569438 C2 20151127; US 2014086783 A1 20140327; US 8999228 B2 20150407

DOCDB simple family (application)

**FR 2011053175 W 20111222**; CN 201180062477 A 20111222; EP 11815535 A 20111222; ES 11815535 T 20111222; FR 1061243 A 20101224; JP 2013545484 A 20111222; KR 20137019553 A 20111222; RU 2013132869 A 20111222; US 201113997558 A 20111222