

Title (en)
INOCULATION PROCESS FOR GRAIN REFINEMENT OF A NICKEL BASE ALLOY

Title (de)
IMPFVERFAHREN ZUR KORNFENERUNG EINER NICKELBASISLEGIERUNG

Title (fr)
PROCÉDÉ D'INOCULATION POUR LE RAFFINAGE DU GRAIN D'UN ALLIAGE À BASE DE NICKEL

Publication
EP 3842556 A1 20210630 (EN)

Application
EP 19383203 A 20191227

Priority
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Abstract (en)
An inoculation process of a nickel base alloy, wherein the process is carried out in a vacuum furnace and comprises: a) providing a melt of a nickel base alloy in vacuum conditions, characterized in that the inoculation process further comprises: b) introducing an encapsulated inoculant comprising a mixture of $\text{Co}_{3\text{FeNb}2}$ and $\text{CrFeNb}(\text{Ni})$ inside the melt of the nickel base alloy at a temperature from 1450 to 1500 °C for a period from 5 to 30 seconds, c) immediately pouring the inoculated nickel base alloy of step b) into a mold, preferably at a temperature from 1450 to 1500 °C, and d) cooling said inoculated nickel base alloy.

IPC 8 full level
C22C 1/02 (2006.01); **C22C 1/06** (2006.01); **C22C 3/00** (2006.01); **C22C 19/03** (2006.01); **C22C 19/05** (2006.01); **F27B 5/04** (2006.01)

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Citation (applicant)

- G. MARAHLEHA. R. I. KHEDERH. F. HAMAD: "CREEP-LIFE PREDICTION OF SERVICE-EXPOSED TURBINE BLADES", MATERIALS SCIENCE, vol. 42, no. 4, 2006
- KUMAR, S.SUDHAKAR RAO, G.CHATTOPADHYAY, K.MAHOBIA, G.S.SANTHI SRINIVAS, N.C.SINGH, V.: "Effect of Surface Nanostructure on Tensile Behavior of Superalloy IN718", MATERIALS AND DESIGN, 2014
- LI YING-JUMA XIAO-PINGYANG YUAN-SHENG: "Grain refinement of as-cast superalloy IN718 under action of low voltage pulsed magnetic field", TRANS. NONFERROUS MET. SOC. CHINA, vol. 21, 2011, pages 1277 - 1282
- J.R. BRINEGARL.F. NORRISL. ROSENBERG: "Superalloy", 1984, article "The Metallurgical Society of AIME", pages: 23
- "Grain Refinement in Casting and Welds", 1983, THE METALLURGICAL SOCIETY OF AIME, pages: 197
- "Superalloys 1984, The Metallurgical Society of AIME", 1984, THE METALLURGICAL SOCIETY OF AIME, pages: 33
- J.M. LANE: "Microcast-x Fine Grained Castings for Aerospace Industry", PRESENTED AT AEROMAT'93 CONFERENCE, 1993
- A.F. DENZINET.A. KOLAKOWSKIJ.F. WALLANCE, PROCEEDING AGARD CONFERENCE ON ADVANCED CASTING TECHNOLOGY, AGARD CONFERENCE PROCEEDING, 1982
- A. N. CHEREPANOVV. E. OVCHARENKO: "Effect of Nanostructured Composite Powders on the Structure and Strength Properties of the High_Temperature Inconel 718 Alloy", THE PHYSICS OF METALS AND METALLOGRAPHY, vol. 116, no. 12, 2015, pages 1279 - 1284
- LIN LIUTAIWEN HUANGYUHUA XIONGAIMIN YANGZHILONG ZHAOARONG ZHANGJINSHAN LI: "Grain refinement of superalloy K4169 by addition of refiners: cast structure and refinement mechanisms", MATERIALS SCIENCE AND ENGINEERING A, vol. 394, no. 2005, pages 1 - 8

Citation (search report)

- [IA] WO 2015108599 A2 20150723 - UNITED TECHNOLOGIES CORP [US]
- [A] GB 414053 A 19340719 - HAROLD SMETHURST, et al
- [A] US 3343828 A 19670926 - HUNT CHARLES D A
- [A] US 4094666 A 19780613 - OTOTANI TOHEI
- [A] JP 5109115 B2 20121226
- [A] EP 1093872 A1 20010425 - GEN ELECTRIC [US]
- [A] CN 108950228 A 20181207 - SHENYANG JINNA NEW MAT CO LTD
- [A] EP 3327159 A1 20180530 - SULZER MANAGEMENT AG [CH]
- [A] US 2015069042 A1 20150312 - SERRAGO DANIEL F [US], et al

Cited by
CN115679137A

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