

Title (en)

CRYSTAL GRAIN REFINING AGENT FOR CASTING AND METHOD FOR PRODUCING THE SAME

Title (de)

KRISTALLKORNVERFEINERUNGSMITTEL ZUM GIESSEN UND VERFAHREN ZU SEINER HERSTELLUNG

Title (fr)

AGENT D'AFFINAGE DE GRAIN CRISTALLIN POUR COULAGE ET SON PROCÉDÉ DE PRODUCTION

Publication

EP 2669028 A4 20160824 (EN)

Application

EP 12738824 A 20120119

Priority

- JP 2011013269 A 20110125
- JP 2012051050 W 20120119

Abstract (en)

[origin: EP2669028A1] [Object] To provide a grain refiner for casting; and a method for producing the same. The grain refiner contains heterogeneous nucleator particles having a smaller degree of mismatching γ with respect to pure aluminum or an aluminum alloy than those of customary grain refiners. [Solution] The grain refiner is produced by rapid and low-temperature sintering through spark plasma sintering. The grain refiner contains heterogeneous nucleator particles that have a small degree of mismatching and originally fail to exist in equilibrium with aluminum. Typically spark plasma sintering gives a grain refiner for casting which includes an aluminum matrix; and particles of an L1 2 structure Al 5 CuTi 2 intermetallic compound dispersed in the matrix. The grain refiner, when added to a molten metal, gives a pure-aluminum or aluminum-alloy cast material having a refined and uniformized microstructure.

IPC 8 full level

B22D 27/20 (2006.01); **B22F 3/105** (2006.01); **C22C 1/02** (2006.01); **C22C 1/04** (2006.01); **C22C 21/00** (2006.01)

CPC (source: EP)

B22F 3/105 (2013.01); **C22C 1/02** (2013.01); **C22C 1/026** (2013.01); **C22C 1/0416** (2013.01); **C22C 1/047** (2023.01); **C22C 1/06** (2013.01); **C22C 21/00** (2013.01); **B22F 2998/10** (2013.01)

Citation (search report)

- [X] JP 2004346368 A 20041209 - NGK INSULATORS LTD
- [A] JP H10317083 A 19981202 - KOBE STEEL LTD
- [A] WO 2007052174 A1 20070510 - TUBITAK [TR], et al
- [A] JP 2001152263 A 20010605 - UEDA SENI KAGAKU SHINKOKAI, et al
- [A] JP H07188701 A 19950725 - SUZUKI MOTOR CO
- [A] WO 8903894 A1 19890505 - MARTIN MARIETTA CORP [US]
- [A] C. SURYANARAYANA, WENKAI LI, F.H. FROES: "Synthesis of Metastable L12 Cubic Phases in (Al,M)3Zr (M=Fe, Ni) Powders by Mechanical Alloying", SCRIPTA METALLURGICA ET MATERIALIA, vol. 31, no. 11, 1994, pages 1465 - 1470, XP002759689
- [A] S. ZHANG, J.P. NIC, D.E. MIKKOLA: "New Cubic Phases Formed By Alloying Al3Ti with Mn And Cr", SCRIPTA METALLURGICA ET MATERIALIA, vol. 24, 1990, pages 57 - 62, XP002759690
- [A] K.T. KASHYAP, T. CHANDRASHEKAR: "Effects and mechanisms of grain refinement in aluminium alloys", BULL. MATER. SCI., vol. 24, no. 4, 2001, pages 345 - 353, XP002759691
- See references of WO 2012102162A1

Cited by

CN109420765A; CN111020248A; CN104439206A; CN109136599A; CN107419135A; CN105648251A; WO2021083385A1; TWI801846B

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)

EP 2669028 A1 20131204; **EP 2669028 A4 20160824**; **EP 2669028 B1 20190717**; JP 5850372 B2 20160203; JP WO2012102162 A1 20140630; WO 2012102162 A1 20120802

DOCDB simple family (application)

EP 12738824 A 20120119; JP 2012051050 W 20120119; JP 2012554746 A 20120119