

Title (en)

Metal matrix composite composition and method.

Title (de)

Verbundmaterial mit Metallmatrix und Verfahren seiner Herstellung.

Title (fr)

Matériau composite à matrice métallique et son procédé de préparation.

Publication

EP 0501539 A2 19920902 (EN)

Application

EP 92200277 A 19920203

Priority

US 65996791 A 19910225

Abstract (en)

A method of making a new metal matrix composite material formed from an aluminium-based alloy and a silicon carbide ceramic material is disclosed, in which preferably a porous pre-form (20) of the silicon carbide ceramic material having SiO₂ on the surfaces thereof is placed in an open-top die (24), heated to an elevated temperature in the range of 399 DEG C and 1093 DEG C, and impregnated under pressure with a molten alloy (27) comprising, by weight about 3 to 6 percent copper, about 0.5 to 5 percent magnesium and the balance essentially aluminium. The silicon carbide pre-form (20) impregnated with molten alloy is then cooled at a rate sufficient to sustain supersaturation of the copper and magnesium in the aluminium down to a predetermined temperature. The predetermined temperature is selected so as to permit precipitation in the alloy of a strengthening copper-rich secondary metallic phase containing copper, magnesium and aluminium and consisting essentially of about 40 to 80 percent by weight copper, magnesium in an amount between about 5 and 30 percent by weight, and the balance essentially aluminium. This results in the formation of a metal matrix composite material having a silicon carbide phase, an aluminium-rich primary metallic phase and a copper-rich secondary metallic phase which has the desired composition. The primary metallic phase can contain up to 10 percent of eutectic phase which is generally present as a coarse network or as isolated islands within the primary phase. Preferably, cooling occurs immediately after the impregnating step and relatively rapidly to a temperature below about 288 DEG C, where precipitation of the secondary metallic phase occurs. Preferably, the secondary metallic phase comprises a cubically-shaped crystal structure which measures about 40 nanometres on a side. <IMAGE>

IPC 1-7

C22C 1/09; C22C 1/10

IPC 8 full level

C22C 1/00 (2006.01); **C22C 1/10** (2006.01); **C22C 29/00** (2006.01); **C22C 29/02** (2006.01); **C22C 32/00** (2006.01); **C22C 47/08** (2006.01); **C22C 49/06** (2006.01); **C22C 49/14** (2006.01)

CPC (source: EP)

C22C 1/1036 (2013.01); **C22C 1/1047** (2023.01); **C22C 32/0063** (2013.01); **C22C 47/08** (2013.01); **C22C 49/06** (2013.01); **C22C 49/14** (2013.01); **B22F 2998/10** (2013.01)

C-Set (source: EP)

B22F 2998/10 + C22C 47/06 + C22C 47/08

Cited by

US6953539B2

Designated contracting state (EPC)

DE FR GB

DOCDB simple family (publication)

EP 0501539 A2 19920902; EP 0501539 A3 19930908; CA 2054018 A1 19920826; JP H0586425 A 19930406

DOCDB simple family (application)

EP 92200277 A 19920203; CA 2054018 A 19911023; JP 3735992 A 19920225