

Title (en)

Hyper-eutectic al-si alloy coating respectively an al-si composite

Title (de)

Beschichtung aus einer übereutektischen Aluminium/Silizium Legierung bzw. einem Aluminium/Silizium Verbundwerkstoff

Title (fr)

Revêtement d'un alliage al-si hyper-eutectique respectivement un al-si composite

Publication

EP 0899354 A1 19990303 (DE)

Application

EP 98113379 A 19980717

Priority

DE 19733204 A 19970801

Abstract (en)

A hypereutectic aluminium-silicon alloy or aluminium-silicon composite material coating has a heterogeneous structure of an aluminium solid solution, intermetallic phases such as Mg₂Si, oxides and (i) silicon precipitates, (ii) embedded silicon particles or (iii) silicon precipitates and embedded silicon particles, the mean size of the primary silicon precipitates or embedded silicon particles being less than 10 µm, the mean oxide size being less than 5 µm and the coating being mainly copper-free, i.e. the copper content is less than 1 (preferably less than 0.1, especially less than 0.01) wt.%. Also claimed are processes for producing the above coatings by thermal (especially atmospheric plasma) spraying with parameters adjusted for formation of oxides. Preferably, the spraying material has the composition (by wt.) (A) (for coating type (i)) 23-40 (especially 25)% Si, 0.8-2.0 (especially 1.2)% Mg, NOTGREATER 0.6% Zr, NOTGREATER 0.25% Fe, NOTGREATER 0.01% each of Mn, Ni, Cu and Zn and balance Al; (B) (for coating type (ii)) as (A) but containing 23-40 (especially 25)% Si, 1-5 (especially 4)% Ni and 1.0-1.4 (especially 1.2)% Fe; (C) (for coating type (iii)) 5-50% Si particles and 50-95% alloy particles of composition (A) but containing 0-11.8 (especially 9)% Si; (D) (for coating type (ii)) 5-50% Si particles and 50-95% alloy particles of composition (B) but containing 0-11.8 (especially 9)% Si; (E) (for coating type (iii)) 5-50% Si particles and 50-95% alloy particles of composition (A) but containing 11.8-40 (especially 17)% Si; or (F) (for coating type (iii)) 5-50% Si particles and 50-95% alloy particles of composition (B) but containing 11.8-40 (especially 17)% Si.

Abstract (de)

Die Erfindung betrifft eine tribologische Beschichtung aus einer kupfer-freien, stark übereutektischen, Aluminium/Silizium-Legierung bzw. aus einem kupfer-freien, Aluminium/Silizium-Verbundwerkstoff, die so zusammengesetzt sind, daß feine Silizium-Primärkristalle bzw. Silizium-Partikel, intermetallische Phasen und Oxide als harte Partikel bei der Herstellung der Schichten im atmosphärischen, thermischen Spritzverfahren sich bilden bzw. in der Gefügestruktur verankert werden. Aufgrund der intermetallischen Phasen wie MgSi₂ und der Oxide läßt sich die Oberfläche der Beschichtung wirtschaftlich mit konventionellen Werkzeugen kurzspanend bearbeiten, so daß auf weitere Legierungselemente wie Kupfer zur Bildung von weiteren intermetallischen Phasen wie Al₂Cu verzichtet werden kann. Dies hat eine besondere Bedeutung beim Einsatz dieser Schichten als Zylinderlaufbahn in einer Hubkolbenmaschine, denn herkömmliche AlSi-Laufbahnen bereiten aufgrund ihres Kupferanteiles Probleme in Verbindung mit bestimmten Kraftstoffen. <IMAGE>

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C23C 4/04; C23C 4/12

IPC 8 full level

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CPC (source: EP KR US)

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