

Title (en)
MULTIPHASE PERMANENT MAGNET OF THE FE-B-MM TYPE

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EP 0286357 A3 19900606 (EN)

Application
EP 88303018 A 19880405

Priority
US 3486287 A 19870406

Abstract (en)
[origin: EP0286357A2] A method is disclosed for producing a permanent magnet of the Fe-B-MM type, comprising: (a) preparing a metallic powder having a mean particle size of 2-5 microns and having a composition comprising, by atomic weight percent: 60-80% Fe, 1-8% Al, 6-10% B, .1-.43% oxygen, 0-5% Dy and/or 0-10% Ni, and 12-22% MM, where MM is a misch metal (preferably having at least four naturally occurring insoluble cerium earth metals with a least 20% of the misch metal consisting of cerium and lanthanum), the powder having essentially a multiphase crystalline structure dominated by at least two R₂Fe₁₄B phases; (b) aligning such powder in a magnetic field; (c) compacting the aligned powder into shapes; (d) sintering such shapes at a temperature and for a period of time (i.e., in the range of 1000-1100 DEG C for .5-9 hours) to fuse the powder and increase the proportion of said R₂Fe₁₄B phases to at least 70% by volume of the shapes; and preferably (e) annealing the sintered shapes at a temperature (i.e., in the range of 550-650 DEG C for 1-4 hours) to cause the shapes to consist essentially of at least two R₂Fe₁₄B phases comprising the matrix and the phase RFe₄B₄ and the R-rich phase residing essentially in the grain boundaries.

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Citation (search report)
• [A] PROCEEDINGS OF THE 8TH INTERNATIONAL WORKSHOP OF RARE EARTH METALS, 1985, pages 541-552, GB; Z. MAOCAI et al.: "Effects of additive elements on magnetic properties of sintered Nd-B-Fe magnet"
• [A] JOURNAL OF APPLIED PHYSICS, vol. 57, no. 8, part 2B, April 1985, pages 4146-4148; M. OKADA et al.: "Didymium-Fe-B sintered permanent magnets"
• [AP] PATENT ABSTRACTS OF JAPAN, vol. 11, no. 150 (C-422)[2597], 15th May 1987; & JP 61284551 A (SEIKO EPSON CORP.) 15-12-1986

Cited by
EP1793392A3; EP1059645A3; FR2652535A1; US7988795B2; US6669788B1; WO9104884A1; WO0048208A1; WO0048209A1; US6322637B1; US6419723B2

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