R&D Trends of Rare Earth Permanents Magnets

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In the past three years, the drastic fluctuation of rare earth (RE) price gave a heavy punch at RE permanent magnet (PM) industry. The soaring RE price has forced manufacturers to try to get rid of the heavy dependence of RE. As a result, global R&D on REPM has focused on the following subjects: low-cost RE-lean/free PM, recycling of REPM, nanocrystalline composite magnet, grain boundary diffusion, hot deformation technique, HDDR technique, high added-value product, PM films and nanoparticles, PM with high coercivity and low temperature coefficient, etc.. Besides, I would also introduce the work of our group in the past three years. This work includes the fundamental investigations, application research and enlarged production in pilot line.

CV：

Aug. 2005 - present, Professor, group leader, Ningbo Institute of Materials Technology and Engineering, Chinese Academy of Sciences

Work topics:

(1) High performance sintered rare-earth magnets and their applications, including NdFeB and SmCo magnets;
(2) High performance hot-pressed permanent magnets;
(3) High performance melt-spun hard magnetic materials;
(4) Application of permanent magnets in advanced devices.

Oct. 2000 – July 2005, Guest Scientist, IFW Dresden, DepartmentofMagnetismandSuperconductivity,Germany.

Work topics:

(1) Melt-spun 2:17 Sm-Co magnets with high coercivity;
(2) Exchange coupling and spring-magnet behavior in nanocomposite Sm-Co magnets;
(3) Magnetocaloric effect and giant magnetoresistance in magnetic materials.

Host: Dr. O. Gutfleisch

Sep. 1998 – Sep. 2000, Postdoctoral Researcher, State Key Lab. for Magnetism, Institute of Physics, Chinese Academy of Sciences,

Work topics:

(1) Anisotropic SmCo-based permanent magnets prepared by melt spinning and their microstructure, magnetic structure and magnetic properties;
(2) Microstructure, and magnetic properties of nanocomposite permanent magnets.

Advisor: Prof. Bao-Gen Shen

Sep. 1993 – Aug. 1998, M.S. and Ph.D. student in Materials Science, Department of Materials Science, XianJiaotongUniversity,receivedmyMasterandPh.Ddegrees.

Work topics:

The effects of intergranular alloying on microstructure, coercivity and its mechanism of sintered Nd-Fe-B magnets.

Advisor: Prof. Xiaotian Wang and Xiaoping Song

Sep. 1989 – Aug. 1993, B. S. student in Materials Science, Department of Materials Engineering, Xian University of Technology.