

The development of Dy free MAGFINE and its applications to Motors

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Abstract

The NdFeB magnet can be classified into the sintered magnet and bonded magnet. The former has superior magnet characteristics but the degree of freedom in shape is highly restricted, whereas the latter has a high degree of freedom, but its magnet characteristics are inferior to the former. When a NdFeB magnet is used at the elevated temperature, part of Nd must be replaced with a high priced Dy to increase its coercive force.

For these reasons, a Dy free and high performance NdFeB bonded magnet is desired strongly.

The author successfully developed a Dy free NdFeB anisotropic bonded magnet based on discovery of new phenomena called as d-HDDR reaction and its mass production process such as a thermally balanced hydrogen reaction furnace, micro capsuled powder, compression molding / injection molding under magnetic field, magnetic die and so on. Applied to DC brush seat motor for automotive use, the motor has become 50% small in size and weight. The commercialization of a half sized motor for automotive use has been realized up to the market share of 30%.

At present, its commercialization is extending to various types of motors such as power tool, ABS motor, wiper motor, window motor, electric bike power motor, and compressor motor. It is expected that the applications will be increasingly enlarged to EV motor, wind generator, EPS motor, washing machine, and glass cutting machine. This innovative technology has realized Dy free high performance magnet and must make big contribution to not only rare element strategies but also energy conservation.

Biography

May, 1974	graduated from Department of physics, school of science, Nagoya University
April, 1974	Joined Aichi Steel corporation
December, 1991	obtained a doctor's degree in Engineering from Nagoya University
January, 1998	General Manager of Aichi Steel
June, 2002	Director of Aichi Steel
June, 2006	Managing Director of Aichi Steel
June, 2010	Senior managing Director of Aichi Steel
June, 2012	Adviser of Aichi Steel

Awards

- 2005 Magnetics Society of Japan Achievement Award for development of high performance bonded magnet for use in automotive small motors
- 2012 Awarded the Minister of Education Prize at the 11th Conference for the Promotion of Collaboration Among Business, Academia, and Government Awards
「for Development of Magnet Compass and Motion Sensor using Magnetic Impedance Sensor」
- 2012 Awarded the 12th Yamazaki Teiichi Prize
(Foundation for Promotion of Material Science and Technology of Japan)
「for Research and Development of Dy-free NdFeB Anisotropic Bonded Magnets and their Motor Applications」