

Motor innovation powered by MAGFINE 25, the world's strongest bonded magnet

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Expectations are increasing for anisotropic NdFeB bonded magnets as magnets that realize lighter smaller, energy-conserving motors for automobiles and household appliances.

After the discovery of NdFeB magnet alloys, from the early 1980s they were tackled as a magnet that could possibly reduce the size of motors used in automobiles, with General Motors taking the lead. The plastic processing method, HDDR method (hydrogenation treatment method) and the like were proposed as a method for producing anisotropic magnet powder, but even now these proposals have not yet led to production on a large scale.

In 1996, Aichi Steel discovered a new phenomenon (Fig. 1, d-HDDR) in which anisotropy appears on the limited condition, based on the reaction kinetics between NdFeB and hydrogen without the addition of the element Co, and in 2002 succeeded at commercializing MAGFINE 25 (below, "MF25"), which has the world's strongest magnetic force with a maximum energy product of 25MGOe.

Further, in 2003, new motor (Fig. 2) using MF 25 were proposed (below, "MF Motor") which make it possible to drastically reduce motor size, causing many to take another look at designs of conventional DC motors using ferrite magnets.

At the same time, the anisotropy mechanism, establishment of the factory for supplying magnet powder, development of anisotropic press molding technology, and sorting out of patent problems have advanced, and MF 25 becomes an easily manageable magnet.

In this presentation, the author will introduce the recent advance of the d-HDDR phenomena and the anisotropy mechanism, magnet performances, and propose the magnet applications for automobile use.

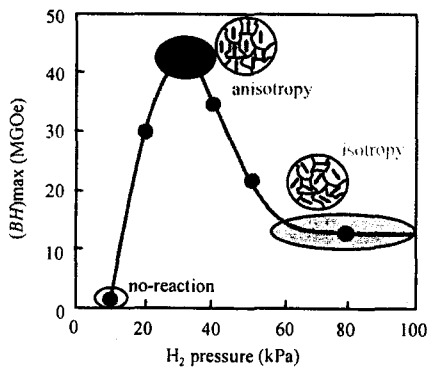


Figure 1. The d-HDDR reaction

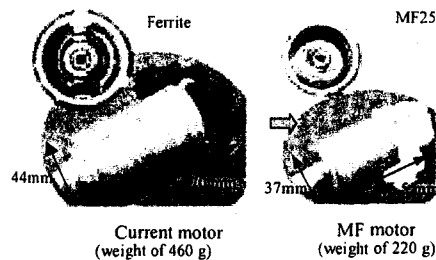


Figure 2. Test produced DC motor