

Fabrication of Isotropic Bond Magnet by Using HDDR Process with Rare Earth Magnet Scrap

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In the automobile industry, one of the most urgent issues is size reduction of automobile components in order to improve the fuel efficiency. For example, many kinds of motors used in automobile were already accepted or are ready to be accepted by rare earth magnet that showing higher performance than hard ferrite magnet. As well known, rare earth magnets show excellent magnetic properties but the cost of them is 10~20 times higher than hard ferrite magnets.

Therefore, a low cost process for rare earth magnets is strongly required to be satisfied the demand of automobile industry. In this study, we designed another HDDR process making a bonded magnet powder with rare earth magnet scrap and compared their magnetic properties and thermal stability with MQP-B+ made by Magnequench Ltd.[1-2]

Starting scraps of 32RE-67TM-1B(in wt.%) magnets were crushed to the coarse powder of 0.5~2.5 mm by hand mill. After hydrogenation treatment at room temperature, the scrap powders were heated up to 750~850°C and maintained for 1 hour under hydrogen of 1 atm for phase disproportionation. Subsequently, desorption and recombination were done by reducing hydrogen pressure down to low vacuum (50 torr) and high vacuum (10^{-5} torr).

As a results, as crushed powder showed poor magnetic properties because those powders have coarse grains and lots of surface defects caused in powder making process. But after hydrogen absorption and desorption reactions, the powders could get fine grain of 200~500 nm and the coercivity of them was improved up to 13 kOe. Fig. 1 shows the demagnetization curves of HDDR treated scrap powder and MQP-B+ powder.

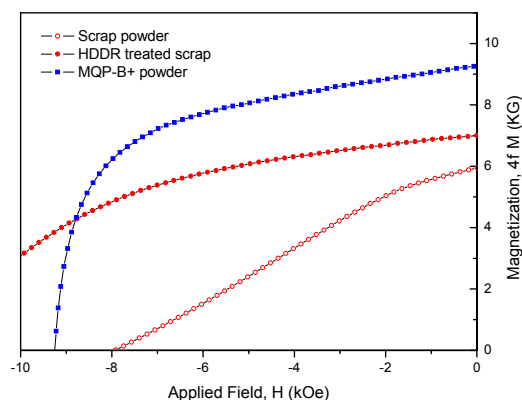


Fig. 1. Demagnetization curves of HDDR treated scrap powder and MQP-B+ powder

References

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