

# The effect of diffusion coating process with Bi of HDDR processed Nd-Fe-B sintered magnetAl

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The Hydrogenation disproportionation desorption recombination(HDDR) process is a generally known technique for the production of Nd-Fe-B permanent magnets with anisotropic magnetic properties that forms superfine grains with the grain size below the single domain size around 300 nm. However, the coercivity of HDDR powders is reported quite lower than theoretically expected value. Since the magnetic properties of Nd-Fe-B sintered magnets are highly influenced by the modification of the Nd-rich grain boundary phase, the diffusion coating method with low melting point metal or eutectic alloy was investigated to form thin and continuous Nd-rich grain boundary phase, resulting in the suppression of the reverse domain nucleation and enhancement of the magnetic properties with HDDR powders. However, the coercivity enhancement was at the expense of the decline of magnetization value. Schrey [1] found doping Bi for Nd-Fe-B magnet can modify the microstructure and improve the thermal stability, which is quite important for further application of Nd-Fe-B magnet. Moreover, doping low melting point metal such as Cu and Ga into NdFeB magnet may improve the wettability along the grain boundary and further increase the Nd content in the grain boundaries. They all belong to the diamagnetic metal and the melting point of Bi is as low as 272 °C, which is very helpful for diffusion coating process.

In this work, the effect of the diffusion coating process with Bi on the HDDR powders was discussed. The Nd-Fe-B magnet was prepared by mixing a certain amount of Bi powders with HDDR powders followed by different diffusion-coating treatment process. The effect of the Bi content and temperature on the structure and magnetic properties of the samples has been investigated.

[1] P.Schrey and M.Velicescu. Influence of Bi-additions on the magnetic and microstructure properties of (Nd,Dy)-Fe-Al-B magnets. *Int.J.Mod.Phys.B* 1993.07:725-728

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