Magnetic properties and structures of HDDR NdFeCoBNbZr alloys

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Since the discovery of HDDR process[1-2], the extensive research has concentrated on the investigation of anisotropy, magnetic properties and phase structures of the NdFeB-based alloy[3-5]. In the present work, the purpose is to develop a new materials and to study the behavior of alloy elements. The magnetic properties and the microstructures of HDDR magnet materials fabricated from the alloys with chemical composition of $Nd_{14}Fe_{bal}Co_{15}B_{6.5}Nb_xZr_y$ (x=0~0.25; y= 0~0.25) have been investigated. Master ingots were prepared using a vacuum induction furnace, and homogenized under argon atmosphere at 1100℃ for 20h. The subsequent HDDR treatments were performed. The variation of the magnetic properties of bonded magnets with HD temperature and DR temperature was studied. The results show that HD temperature and DR temperature affect the magnetic properties of HDDR magnet powders obviously. The analysis of XRD spectra shows that the process of HDDR technique is hydrogenation disproportionation desorption recombination. The addition of a little Nb element is useful to improve the magnetic properties of HDDR magnetic powders. And the composite addition of a little Nb and Zr can further enhance the magnetic properties. The reasons for the enhancement of the magnetic properties by the composite addition of a little Nb and Zr are analyzed. Fig. 1 shows that the variation of the magnetic properties of the bonded magnets with Nb and Zr content.

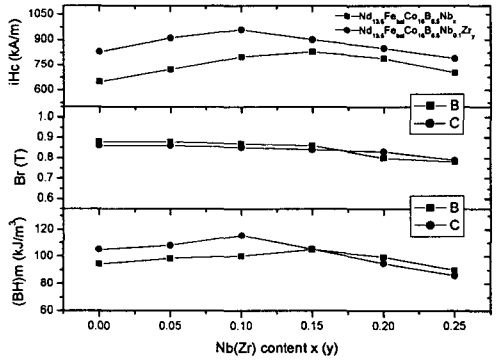

Fig. 1 the variation of the magnetic properties of the bonded magnets with Nb and Zr content

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