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The process of NdFeB powder fabricated by the gas atomizing method

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1. Introduction

Gas atomization technique is a potential alternative method for Nd-Fe-B powder production, which allows real mass production at relative low cost level [1]. Comparing with the traditional powders produced by melt spinning process, powders produced by gas atomization technique can get rather spherical morphology and fine particle size. So it is suitable to be used to produce bond magnet, especially small and complicatedly shaped bond magnets [2].

In this work the morphology, size distribution and particle structure of Nd-Fe-B powders produced by gas atomization method are reported.

2. Experiment

The composition of alloy was $Nd_{15.1}Dy_{1.0}Fe_{75.7}B_{8.1}Zr_{0.1}$. The elements of Nd, Dy, Fe B, Zr with purity of 99.9% were used as row materials. Materials of crucible and nozzle were pure alumina. Nozzle size was 3㎜. Argon gas was used as atomizing gas and the pressure used in this work was 55atm and 65atm. Raw materials were inductively melted in an argon atmosphere and melting temperature was about 1700℃.

The distributions of powders produced in different pressure were measured by screening method. Morphology of powders was observed with SEM and particle structure was analysis from X-ray analyzer, using CuK_α radiation and diffraction angle 2Θ in the range from 20 to 70 degree.

3. Results and discussion

Fig. 1 shows the morphology of powders produced by gas atomization. The particle shape is rather spherical and particle size is quite dispersed. The distributions of particle size are showed in fig. 2. More than 70% of particles are smaller than 20㎛ and higher the pressure smaller the particle size. Fig. 3 is the X-ray diffraction pattern of the powders smaller than 20㎛. It shows that Nd-Fe-B phase had been crystallized.

4. References

[1] D. j. Branagan, T. A. Hyde, C. H. Sellers, and L. H. Lewis, IEEE Trans. Magn. 32(1996),

5097.
[2] Barry H. Rabin and Bao Min Ma (2001) 일본자기학회 120회 연구회자료 p23

Fig. 1 The morphology of powders produced by gas atomization.

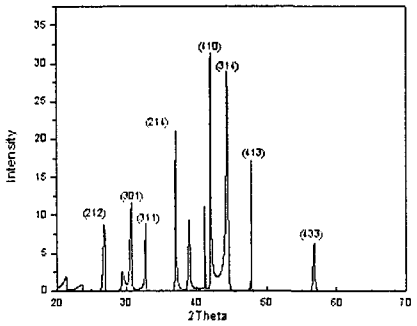

Fig. 3 The X-ray diffraction pattern of the powders smaller than 20㎛.

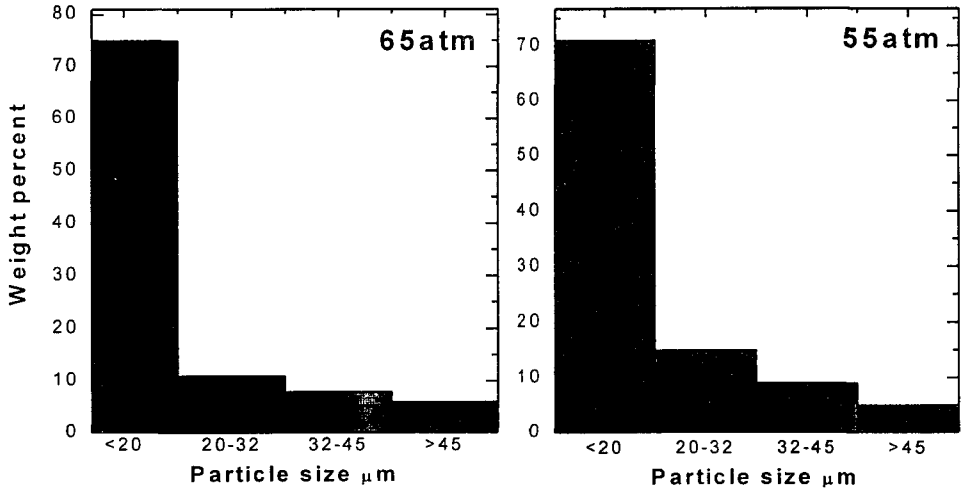

Fig.2 The distribution of particle size