

Study on the interaction of compound bonded magnets

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The addition of Nd₂Fe₁₄B/Fe₃B magnetic powder taking effect on the properties of other magnetic powders was studied. The double phase nanocomposite Nd₂Fe₁₄B/Fe₃B magnet was limited to use in the high temperature condition because of its bad thermal stability^[1]. However it is paid much attention to because of its better theoretical magnetic properties^[2] and cheaper price than other MQ magnetic powders^[2]. But it is doubtful whether chemical interaction exists between different powders or not, when two powders are compounded. Nd₂Fe₁₄B/Fe₃B magnetic powder was put into several different magnetic powders in the experiment, and there are mainly three results obtained. Firstly, the value of magnets' remanence Br is linear with the two kinds of powders' weight percentage, so it means that not chemical but simple physical interaction exists between the two powders while the two magnetic powders are compounded to magnets. Therefore we can easily obtain the Br of compound bonded magnets with different components by linear function. Secondly, for Nd₂Fe₁₄B/Fe₃B--Ferrite compound bonded magnets, the intrinsic coercive force jH_c's temperature coefficient β_{jH_c} of the nanocomposite Nd₂Fe₁₄B/Fe₃B is -0.57%/°C (20--100 °C). The β_{jH_c} of compound magnets was obviously decreased following the content of Ferrite magnetic powder raised, even the β_{jH_c} is similar to zero as the content of Ferrite reaches a certain degree so as to improve the thermal stability of magnets. Thirdly, according to the physical compound principle, the magnetic properties parameters of bonded magnets can be presented by secondary functions just as Nd₂Fe₁₄B/Fe₃B--Ferrite compound magnets. It means that the magnetic properties parameters can be easily obtained by simple mathematical method. In additional, as far as the Nd₂Fe₁₄B/Fe₃B--Ferrite compound magnets is concerned, the irreversible loss h_{irr} and mechanical properties of magnets were fairly enhanced as the content of Ferrite magnetic powder was raised.

Key words: nanocomposite, bonded magnet, temperature coefficient, secondary function, magnetic remanence.

References

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