Development of $Sm_2Fe_{17}N_3$ Sintered Magnets

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$Sm_2Fe_{17}N_3$ alloy has the potential to exhibit higher $(BH)_{max}$ than $Nd_2Fe_{14}B$ magnets under hot environments such as driving motors of electric vehicles. However, it has been hampered by difficulty of producing sintered magnets. The primary reason of this difficulty is a drastic degradation of coercivity during sintering. We recently proposed that this coercivity degradation occurs due to the existence of surface oxide film of powder. Therefore, this study constructed a low-oxygen process capable of producing $Sm_2Fe_{17}N_3$ sintered magnets while avoiding the oxidation of particle surfaces. As a result, the sintered magnets produced under the low-oxygen environment successfully maintained the original coercivity of raw powder. In addition, it was proven that the coercivity was gradually decreased as the oxygen content was increased. In conclusion, this study demonstrated that $Sm_2Fe_{17}N_3$ sintered magnets can be realized by avoiding surface oxidation of powder.