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High Coercive Nd-Fe-B Sintered Magnets for High Temperature Application

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In the automobile industry, the most urgent issue is improving the fuel efficiency to overcome oil crisis. Many conventional internal combustion engines were already replaced or are ready to be replaced by a hybrid system that utilizing high performance driving motors, creating so-called "hybrid vehicles" Because the working temperature of a driving motor in a hybrid vehicle is increased up to 200~220°C, a high coercive permanent magnet is strongly required to provide stable magnetic properties at such high temperatures. In this study, we designed high temperature magnets with 32"34RE-67"68TM-1B (in wt.%) and investigated the irreversible flux loss depending on the coercivity [1-2].

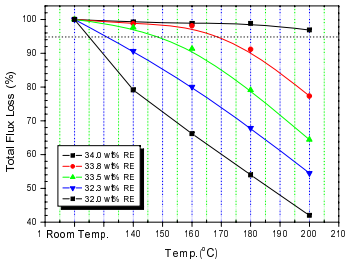

Fig. 1. Irreversible flux losses depending on temperature.

Starting alloys of 32"34RE-67"68TM-1B(in wt.%) were prepared by strip casting under Ar atmosphere. After hydrogenation and de-hydrogenation treatment, the alloys were crushed by a jet mill to magnetic powder with an average particle size of 3.5 um. Magnetic alignment and pressing were done sequentially by TDP process. Finally, the compacts were sintered at 1060~1100°C for 4hr and annealed at 500~600°C for 2hr. Magnetic properties and the irreversible flux loss were measured by a BH loop tracer (Walker-AMH5020) and a flux-meter after the magnets were pulse-magnetized at 5T.

As shown in Fig. 1, a high temperature magnet was obtained when the RE content was 34 wt%. The coercivity and the irreversible flux loss (at 200°C) of the magnet were 33 kOe and 0.49%, respectively. The irreversible flux loss was sensitively relied on the coercivity of the magnets.

REFERENCES

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