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Wed-Mo-Po3.12-08 [103]: A study on the magnet structure for reducing demagnetization by grain boundary diffusion method

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Permanent magnets are largely classified into ferrite magnets, Alnico magnets, and rare earth magnets. Ferrite magnets and Alnico magnets are significantly less magnetic than rare earth magnets. Therefore, when a rare-earth magnet is used, it is advantageous in size and weight because it uses less magnet than other magnets. Particularly, in the case of a magnet used in a vehicle, it is necessary to reduce the size and weight of the magnet. The motor used in the vehicle may have irreversible demagnetization depending on the temperature to be driven and the parameters to be applied. If a irreversible demagnetization occurs, the performance of the magnet is deteriorated, and the output characteristics of the motor can not be improved due to the failure of the motor. In this paper, the motors for ISG use rare earth magnets. Rare earth magnets can be caused irreversible demagnetization at high temperatures. The portion of the motor magnet where the irreversible demagnetization occurs locally occurs more in the edge than in the central portion of the magnet. In the grain boundary diffusion, it is possible to selectively inject Dy and Tb into the rare earth magnet surface. Therefore, we distribute Dy and Tb components locally on the surface of the magnet and the edge where irreversible demagnetization can occur, thereby enhancing the coercive force and suggesting a method advantageous to irreversible demagnetization. The electromagnetic characteristics were analyzed by finite element method. Electromagnetic analysis is performed by using the ANSYS Electromagnetic Suite 19.0. We make a model applying grain boundary diffusion to the part where demagnetization occurs, and conduct a demagnetization experiment by conducting a single piece test with a normal magnet. Then, each magnet is mounted on the ISG model, and the electromagnetic characteristics test and the demagnetization test are carried out.

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