● FY2011 Kazuhiro Hono (Fellow, National Institute for Materials Science)

Coercivity Mechanism of Nd-Fe-B Permanent Magnets

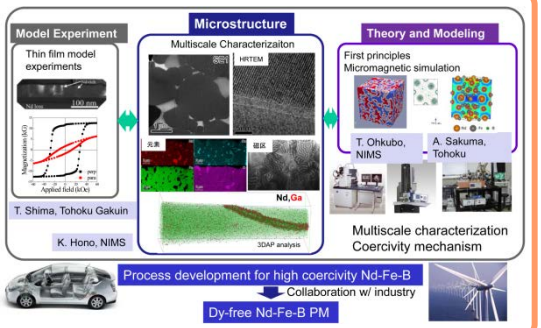
Research Project Outline（From Oct. 2011 to Mar. 2017）

Coercivity enhancement of Dy-free Nd-Fe-B based permanent magnets

◎Understanding the coercivity mechanism of Nd-Fe-B permanent magnets

◎Application of the fundamental knowledge to the development of high coercivity Nd-Fe-B magnets

→Basic research on the coercivity-microstructure relationships to develop high coercivity Nd-Fe-B permanent magnets for HV and EV

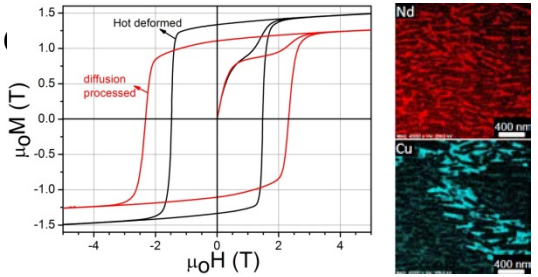


Research Results (FY2012)

◆Enhancement of coercivity of hot-deformed anisotropoi Nd-Fe-B magnets by the Nd-Cu diffusion process

- ✓Enhancement of the coercivity from 1.3 T to 2.2 T by the Nd-Cu diffusion process applied to hot-deformed anisotropic Nd-Fe-B magnets
- ✓Detailed information on the microstructure-coercivity relationships of hot-deformed magnets

Dy-free high Hc Nd-Fe-B magnets



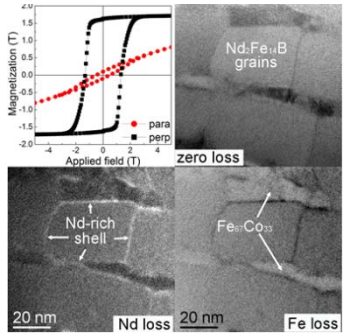
Nd-Cu diffusion processed Nd-Fe-B hot-pressed magnet

Inter. Workshop on Rare Earth Permanent Magnet . September 3-5, 2012, Nagasaki.

◆Demonstration of highest energy density using anisotropic $Nd_2Fe_{14}B$/FeCo nanocomposite film

- ✓$\mu_0 H_c$=1.4 T, $(BH)_{max}$=474 kJ/m^3 using anisotropic $Nd_2Fe_{14}B$/FeCo nanocomposite film
- ✓Understanding coercivity mechanism by domain wall observation using Lorentz microscopy

Highest energy density PM



$Nd_2Fe_{14}B$/FeCo nanocomposite magnet

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