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Magnetic structure and coercivity mechanism of AlNiCo magnets studied by electron holography

Shimeng Zhu ^{a, b, *}, Jiangtao Zhao ^{b, *}, Weixing Xia ^{b, **}, Yingli Sun ^{b, ***}, Yong Peng ^a,
Jiecai Fu ^a

^a Key Laboratory of Magnetism and Magnetic Materials of Ministry of Education,
Lanzhou University, Lanzhou 730000, People's Republic of China

^b Key Laboratory of Magnetic Materials and Devices, Ningbo Institute of Material
Technology and Engineering, Chinese Academy of Sciences, Zhejiang 315201,
People's Republic of China

* These authors contributed equally to this work.

** Corresponding author.

*** Corresponding author.

E-mail addresses: xiawxing@nimte.ac.cn (W. Xia), yinglisun@nimte.ac.cn (Y. Sun)

Abstract

Micromagnetic structure and coercivity were systematically investigated by electron holography and micromagnetic simulation. The experimental data show that the distribution of magnetic flux lines of FeCo-rich (α_1) phase is different from that of AlNi-rich (α_2) phase. Quantitative analysis based on the measurement of electron holography show that the magnetizations and coercivities of α_1 phases for 36Co and 40Co are calculated to be 11.0 kG and 8.5 kG, 1848 Oe and 3029 Oe, respectively. Further micromagnetic simulations reveal that the decrease of α_1 phase diameters and the weakened exchange coupling (increased distance) between adjacent phases are critical factors to increase the coercivities of AlNiCo magnets, well matching with the measured results from electron holography.

Keywords: Permanent magnet; Electron holography; Micromagnetic structure; Micromagnetic simulation

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