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Synthesis and characterization of 1-dimensional NdFeB nanofiber using the electrospinning process

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The development of permanent magnet materials has led to the demand for innovative technologies such as electric motors and generators for energy conversion devices. Especially, The hard magnet materials based on NdFeB have been applied to wide areas such as automobiles, electrical devices and magnetic disks due to their excellent magnetic properties. The NdFeB including the transition metals such as Fe has also magneto-optical effects. NdFeB based magnetic materials were generally synthesized using the classical powder metallurgy process. However, it was difficult to align easy magnetization axis (c-axis) and to obtain homogeneous microstructure for enhancing magnetic performances. There has also been little significant research on one-dimensional Nd-Fe-B magnetic synthesizing c-axis alignment. In this study, one-dimension NdFeB materials having c-axis alignment were facilely prepared through electrospinning process. In order to confirm magnetic properties with wire diameter, synthesis conditions were controlled by PVP volume. These Nd-Fe-B fibers had the diameter within a range from 700 to 1300nm. These metal oxides polycrystalline fibers were subsequently heat treated in the high vacuum furnace in the presence of the calcium as a reducing agent, resulted in $Nd_2Fe_{14}B$ fibers. The morphology of the synthesized Nd-Fe-B material was 1300nm analyzed by field emission scanning electron microscope (FE-SEM) and X-ray diffraction (XRD). The magnetic property as a function of Nd-Fe-B wire diameter was conducted using vibrating sample magnetometer (VSM). The coercivity (H_{ci}) of $Nd_2Fe_{14}B$ fibers was about 4800Oe. The values of saturation magnetization (Ms) and remanence (Mr) of fibers were 45emu/g and 20 emu/g.

Biography

Nu Si A Eom has completed PhD in the year 2017 at the age of 30 years from Hanyang University in Korea. Her master's project was "Synthesis and Characterization of CdSe based Quantum Dots" and her PhD project was "New approaches for improving SnO2 and silicon-based semiconductor gas sensor at room temperature by micro/nano hybridization" in Korea. She has published several articles in SCI journal. Her main academic interests are quantum dot and semiconductor gas sensor. In 2018, Her current research concerns magnetic materials in Korea Institute for Rare Metal, Korea Institute of Industrial Technology.

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