



논문개요집

ISSN 2233-9485(Print)
ISSN 2233-9574(Online)

2021년 한국자기학회 하계학술대회

2021 KMS Summer Conference

논문개요집



일시 2021. 7. 21(수) ~ 23(금)

장소 강릉 세인트존스호텔

주최 한국자기학회

후원     한국재료연구원  파워유닛스마트제조센터

Digests of the 2021 KMS Summer Conference
The Korean Magnetics Society

○ Session EM [Electro-Magnetic Energy Conversion]

- EM01 Poster Coil Arrangement to Reduce AC Copper Loss by Applying Strand and Transposition of Ultra-high-speed Motor for Air Compressor of Fuel Cell Vehicle 19
Sun-Yong Shin*, Jin-Cheol Park, Jun-Woo Chin, Myung-Seop Lim

○ Session MS [Magnetics in Medical Science]

- MS01 Poster Digital Coordinate Determination of 29 x 29 Scintillation Array Detector using Simulated LUT and MLPE 21
Seung-Jae Lee*, Cheol-Ha Baek†
- MS02 Poster Synthesis and Magnetic Characteristics of Gamma Phase Iron oxide and Magnesium Iron oxide Nanoplates for Magnetic Hyperthermia Therapy 22
Pyung Won Im*, Man Seung Heo, Hyung Woo Park, Yona Kim and Sun Ha Paek
- MS03 Poster Use of fast non-local means approach for noise reduction in diffusion weighted magnetic resonance imaging with high b-value 23
Jaeyoung Park, Chang-Ki Kang, Seong-Hyeon Kang, Youngjin Lee*

○ Session MM [Mössbauer Magnetics]

- MM01 Poster 뢰스바우어 분광학을 이용한 $\text{Ba}_2\text{Co}_{1.7}\text{Mg}_{0.3}\text{Fe}_{12}\text{O}_{22}$ 의 자기적 특성 연구 24
백재성*, 심인보, 김철성†
- MM02 Poster Crystal structure and Mössbauer studies of $\alpha\text{-NaFeO}_2$ 26
Jin Gyo Jung*, Hyunkyung Choi, In-Bo Shim, Chul Sung Kim†
- MM03 Poster Synthesis and magnetic properties of iron catalyst $\text{Fe}_{1.5}\text{@Pt/C}$ (Fresh) 28
Hyunkyung Choi*, Jin Gyo Jung, Hyun-Uk Park, Eunjik Lee, Gu-Gon Park, Sung-Dae Yim and Chul Sung Kim†
- MM04 Poster Mössbauer studies on core-shell $\text{Fe}_{1.5}\text{@Pt/C}$ nanoparticles post-heated in NH_3 gas atmosphere 30
Hyunkyung Choi*, Jae Sung Baik, Hyun-Uk Park, Eunjik Lee, Gu-Gon Park, Sung-Dae Yim and Chul Sung Kim†
- MM05 Poster Investigation for Manufacture of the Portable Backscattering Mössbauer Spectrometer 32
Mingi Eom*, Young Rang Uhm, Jaegi Lee, Gwang-Min Sun

○ Session SS [Spintronics]

- SS01 Poster Orbital angular momentum of a domain wall and geometrically twisted magnons 34
Seungho Lee* and Se Kwon Kim

Crystal structure and Mössbauer studies of α -NaFeO₂

Jin Gyo Jung^{*}, Hyunkyung Choi, In-Bo Shim, Chul Sung Kim[†]

Department of Physics, Kookmin University, Seoul 02707, Korea

Lithium – ion batteries (LIBs) have excellent electrochemical performance. However, lithium's price is increased due to the low reserves all over the world. As the alternative cathode material of lithium, sodium has attracted attention. It is environmentally friendly, and it is cost-advantage because of the abundance worldwide. Also, the de-intercalation/intercalation properties of sodium-ion batteries (SIBs) are similar to those of LIBs. However, sodium has the disadvantage of being heavy and has a lower energy density than lithium. To solve this problem, sodium layered oxide is recently being studied. NaMO₂ (M = Fe, Co, Ti, Mn, Ni, etc.) has high volume and gravitational density. In this study, the crystal structure, and magnetic properties of NaFeO₂ materials were characterized by X-ray diffraction (XRD), vibrating sample magnetometry (VSM), and Mössbauer spectra measurements.

NaFeO₂ was synthesized using the solid reaction method from Na₂CO₃ (99.5%) and Fe₃O₄ (99%) as starting materials. The mixture mixed at a ratio of 1:1. After grinding the mixture in an agate mortar, there was calcined at 300 °C for 5 h. The calcined mixture was ground again in an agate mortar and compressed using a disk-shaped pellet. The compressed mixture was sintered to 650 °C for 12 h. To confirm the crystal structure of NaFeO₂, it was measured by XRD with Cu-K α radiation ($\lambda = 1.5406$ Å). Mössbauer spectra measured from 4.2 K to 295 K on a Mössbauer spectrometer, and the VSM measured magnetic properties through the zero-field-cooled (ZFC) and field-cooled (FC) measurements from 4.2 K to 295 K with magnetic fields of 0.1 kOe and 1 kOe.

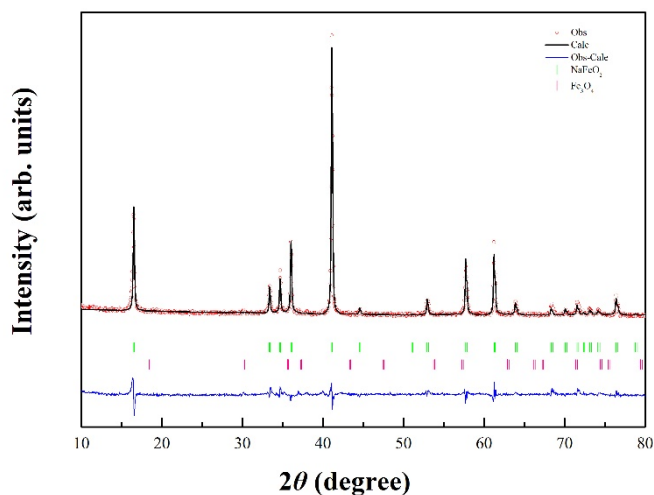


Fig. 1. Refined XRD patterns of NaFeO₂

The crystal structure of NaFeO₂ samples were analyzed using the FULLPROF program after XRD experiment at room temperature. As a result of the analysis, it was found that 5.37% of Fe₃O₄ was present in NaFeO₂ sample. it has a trigonal structure with space group of R-3m. The lattice constants were analyzed as $a = b = 3.0251$ Å, $c = 16.0983$ Å. To know the magnetic properties, VSM was experimented from low to room temperature at 0.1

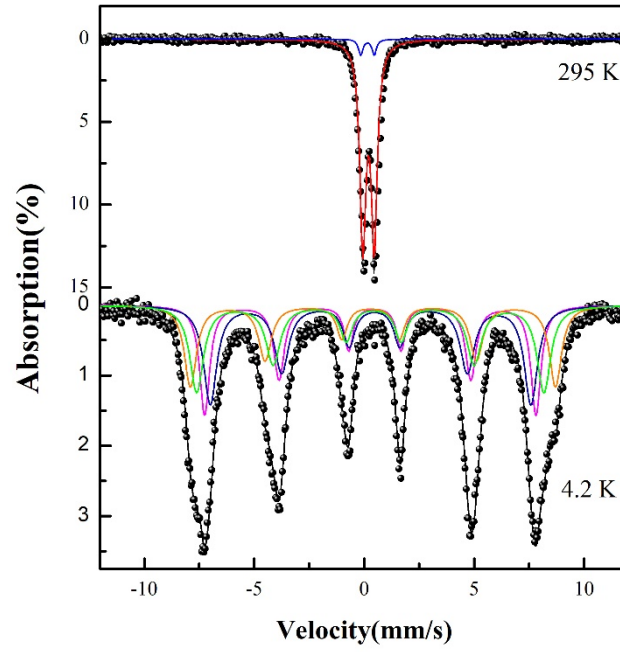


Fig. 2. Mössbauer spectra of NaFeO₂ at 4.2 and 295 K

kOe. it was shown through ZFC-FC data that the Néel temperature (T_N) of NaFeO₂ is 11 K. As a result of Mössbauer spectroscopy analysis from 4.2 K to 295 K, the values of magnetic hyperfine field (H_{hf}) at 4.2 K are $H_{hf}(1) = 468.31$ kOe, $H_{hf}(2) = 453.41$ kOe, $H_{hf}(3) = 516.00$ kOe, $H_{hf}(4) = 490.79$ kOe, and the electric quadrupole splitting and isomer shift of NaFeO₂ at 11 K are measured to be 0.51 mm/s, and 0.37 mm/s.