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논문개요집

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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

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

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

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

Jaeyoung Park, Chang-Ki Kang, Seong-Hyeon Kang, Youngjin Lee*

Session MM [Mössbauer Magnetics]

MM01 Poster 鈷酸鈦・水素化鈦Fe2O3の磁気特性研究

백재성*, 심인보, 김철성†

MM02 Poster Crystal structure and Mössbauer studies of α-NaFeO2

Jin Gyo Jung*, Hyunkyang Choi, In-Bo Shim, Chul Sung Kim†

MM03 Poster Synthesis and magnetic properties of iron catalyst Fe1.5@Pt/C (Fresh)

Hyunkyoung 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 Fe1.5@Pt/C nanoparticles post-heated in NH3 gas atmosphere

Hyunkyoung 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

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

Seungho Lee* and Se Kwon Kim
Mössbauer studies on core-shell Fe$_{1.5}$@Pt/C nanoparticles post-heated in NH$_3$ gas atmosphere

Hyunkyung Choi$^{1*}$, Jae Sung Baik$^1$, Hyun-Uk Park$^2$, Eunjik Lee$^2$, Gu-Gon Park$^2$, Sung-Dae Yim$^2$ and Chul Sung Kim$^{1†}$

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Fe$_{1.5}$@Pt/C core-shell is used as an electrode catalyst for fuel cells, and research has been conducted to reduce costs and improve performance for application to fuel cells. In this study, the structural and magnetic properties of the Fe$_{1.5}$@Pt/C core-shell heat treated in an NH$_3$ gas atmosphere were investigated.

The Fe$_{1.5}$@Pt/C core-shell was prepared using the sonochemical method. Fe(acac)$_3$, Pt(acac)$_2$, and carbon support (Vulcan XC-72R) were dispersed in ethylene glycol. The mixture was placed in a girb0type sonicator and then it was irradiated over 3 h. To remove residual ethylene glycol, the obtained black slurry was filtered and washed with ethanol and DI water. The sample was dried in a vacuum oven at 70 °C for 12 h. Then, the post-heat treated Fe$_{1.5}$@Pt/C samples in an NH$_3$ gas atmosphere were annealed at 510 °C for 2 h. To remove iron oxides and other residues from the heat-treated sample, the sample was acid-treated in 0.1M HClO$_4$ at 85 °C for 2 h. In order to obtain a clear core-shell structure, the sample was additionally annealed at a temperature of 300 °C in an H$_2$/N$_2$ atmosphere for 2 h. And finally, Fe$_{1.5}$@Pt/C with a core-shell structure was obtained. The sample was denoted as Fe1.5@Pt/C_NH3.

The crystallographic properties and core-shell structure of the Fe$_{1.5}$@Pt/C_NH3 core-shell were confirmed through X-ray diffraction (XRD), transmission electron microscopy (TEM), and scanning transmission electron microscopy–energy dispersive spectroscopy (EDS). In addition, in order to investigate the magnetic properties of
the sample, the Mössbauer spectra were observed at 4.2 and 295 K and the M-H curve was measured using a vibrating sample magnetometer (VSM). Pt peaks were confirmed from the XRD patterns and the average crystallite sizes of the sample was confirmed to be 4.9 ± 1.4 nm using TEM image. The EDS line profile of Fe\textsubscript{1.5}@Pt/C\_NH\textsubscript{3} revealed a core-shell structure with a Pt skin layer (0.3 nm). The saturation magnetization and coercivity at 295 K were 7.1 emu/g and 134.5 Oe, respectively. The Mössbauer spectrum of the Fe\textsubscript{1.5}@Pt/C\_NH\textsubscript{3} at 295 K were analyzed with 4 sets of doublets and the electric quadrupole splitting (ΔE\textsubscript{Q}) values were ΔE\textsubscript{Q,1} = 0.44 mm/s, ΔE\textsubscript{Q,2} = 0.17 mm/s, ΔE\textsubscript{Q,3} = 1.04 mm/s, and ΔE\textsubscript{Q,4} = 0.07 mm/s, respectively. Also, the spectrum at 4.2K was measured with 3 sets of sextet and one doublet and the magnetic hyperfine field (H\textsubscript{hf}) values were analyzed as H\textsubscript{hf,1} = 325.2 kOe, H\textsubscript{hf,2} = 339.7 kOe, and H\textsubscript{hf,3} = 323.6 kOe, respectively. From the isomeric shift values, all Fe valence states was determined to be ferric.