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The Study of Magnetic Properties in Lithium-iron Phosphate

Seung Je Moon[1], Choong-Sub Lee[2], and Chul Sung Kim[1]*

[1]Department of Physics, Kookmin University, Seoul 136-702, Korea

[2]Department of Physics, Pukyong National University, Pusan 608-737, Korea

*Corresponding author: Chul Sung Kim, e-mail: cskim@kookmin.ac.kr

Since the magnetoelectric (ME) effect was observed in Lithium-orthosphates $LiMPO_4$ ($M=Fe^{2+}$, Mn^{2+}, Co^{2+}, Ni^{2+}), have been extensively investigated for information storage and electronic, magnetic and optical switches [1]-[3]. The polycrystalline sample of $LiFePO_4$ and $LiFe_{0.8}Co_{0.2}PO_4$ was made by using a direct reaction. X-ray diffraction pattern for $LiFePO_4$ and $LiFe_{0.8}Co_{0.2}PO_4$ showed a pure olivine single phase. The crystal structure of $LiFePO_4$ and $LiFe_{0.8}Co_{0.2}PO_4$ was determined to be an orthorhombic with space group *Pnma*. The determined lattice constants a_0, b_0, and c_0 are 10.241 and 10.397 Å, 5.924 and 6.002 Å, and 4.698 and 4.700 Å, respectively. The Mössbauer spectrum shows a large asymmetric and distorted line broadening at 4.2 K. The magnetic hyperfine field (H_{hf}) and the quadrupole splitting (ΔE_Q) were 135 and 129 kOe, 2.61 and 2.61 mm/s, respectively. The charge states of Fe ions are Ferrous (Fe^{2+}) in character by isomer shift; 1.25 and 1.24 mm/s at 4.2 K.

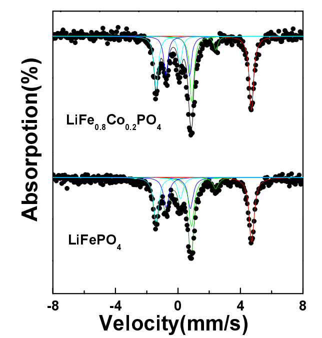

Fig. 1. Mössbauer spectra of $LiFePO_4$ and $LiFe_{0.8}Co_{0.2}PO_4$ at 4.2 K.

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BS19

Magnetic Properties of Fe-doped $La_{0.5}Sr_{0.5}TiO_3$ Nanoparticles

K. Wongsaprom*, E. Swatsitang, and S. Maensiri

Small & Strong Materials Group (SSMG), Department of Physics, Faculty of Science,
Khon Kaen University, Khon Kaen, 40002, Thailand

*Corresponding author: K. Wongsaprom, e-mail: wkwanruthai@gmail.com

Dilute magnetic oxides have been intensively researched in recent years. It has been reported that the wide band gap materials ZnO, TiO_2 and SnO_2 exhibit ferromagnetism with a curie temperature above room temperature when the oxide doped only a few atomic percent of 3*d* transition metals [1-6]. In this paper, we report on the effects of percent dopant and calcination temperature in the nanoparticles of Fe-doped $La_{0.5}Sr_{0.5}TiO_{3-\delta}$ ($La_{0.5}Sr_{0.5}Ti_{1-x}Fe_xO_{3-\delta}$, $0 \leq x \leq 0.02$) synthesized by a polymerized complex method [7-9]. The structure, elemental composition, morphology and particle size of the synthesized nanoparticles were investigated by XRD, EDS, FESEM and TEM. The magnetic properties of the nanoparticles were characterized by vibrating sample magnetometry (VSM) superconducting quantum interference magnetometer (SQUID). The undoped samples show a diamagnetic behavior, whereas all the Fe-doped samples are ferromagnetic at room temperature having the magnetic moment of ~0.003-0.101 $Am^2\,kg^{-1}$ (0.022-0.252 μ_B/Fe) at 10 kOe.

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