ABSTRACTS

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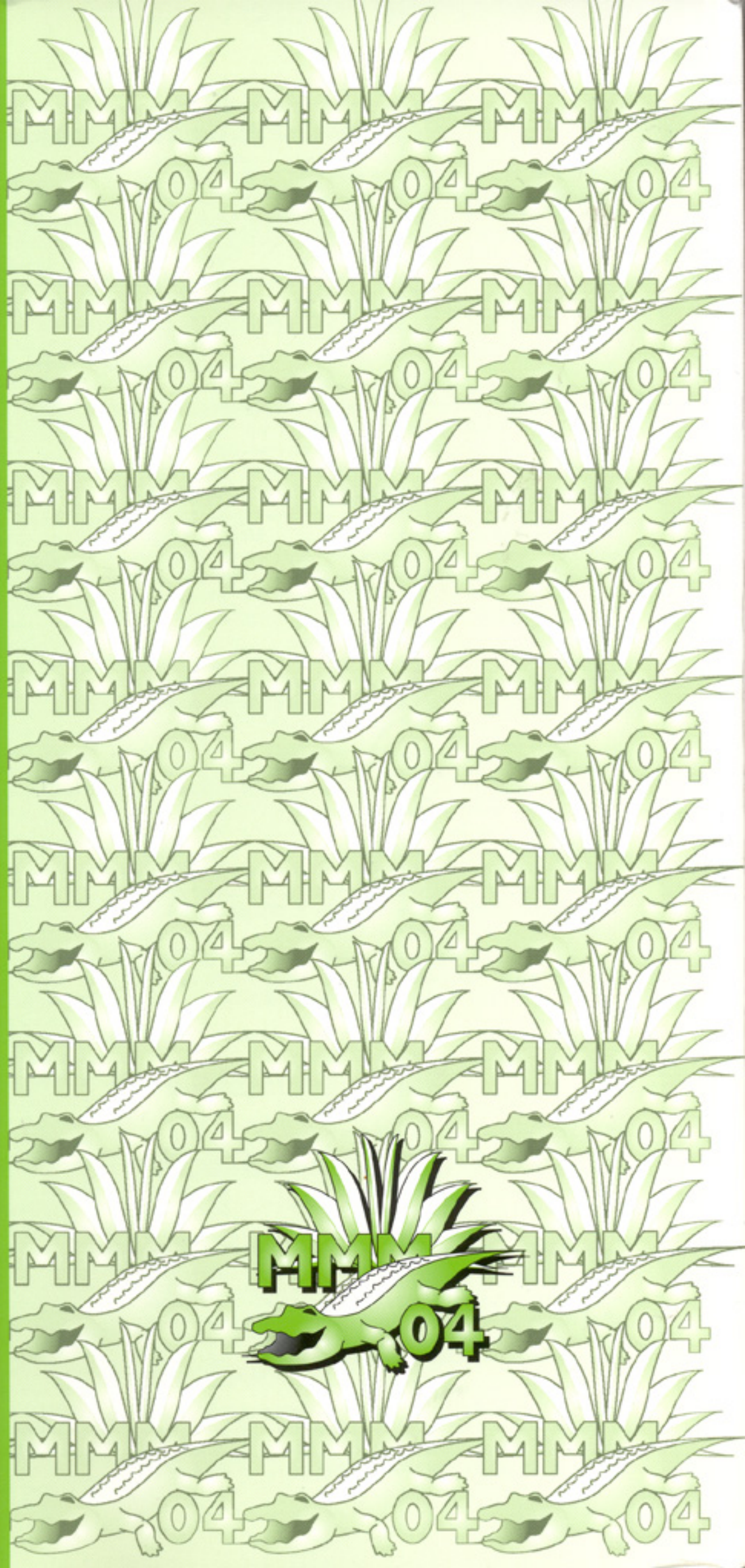

GT-11. Characterization of the Fe-doped YMn2O5 multiferroic materials. J. Yeom[1], S. An[1], *I. Shim*[1] and C. Kim[1] *1. Department of Physics, Kookmin University, Songbuk-gu, Seoul, South Korea*

The structural and magnetic properties of the $YMn_{2-x}Fe_xO_5$ ($0.0 \leq x \leq 1.0$) pseudo-binary oxides have been studied utilizing x-ray diffraction (XRD), Mössbauer spectroscopy, and magnetic measurements. This work is concerned with experimentally investigating at the effects of Fe doping on the structural and magnetic properties of YMn_2O_5. Our interest in these oxides begins with the hypothesis that both ferroelectric and ferromagnetic properties coexist (a condition known as "Ferroism" [1]) in these materials. These unique properties make it attractive for a variety of tunable sensor applications. Fe-doped YMn_2O_5 series have been successfully prepared by means of the sol-gel process. Fe-doped YMn_2O_5 powders that were annealed at 1400 °C have a single-phase hexagonal structure. The space group is $P6_3cm$. The lattice parameters a=6.154 and c=11.415 Å for x=0.0, and a=6.102 and c=11.304 Å for x=1.0. YMn_2O_5 showed paramagnetic behavior at room temperature. However, Fe-doped $YMn_{2-x}Fe_xO_5$ ($0.2 \leq x \leq 1.0$) particles, magnetic hysteresis is observed, indicating that these materials are ferromagnetic even at room temperature. The magnetic moments increased with increasing Fe concentration x. The Mössbauer spectra for the Fe-doped samples at room temperature showed single quadrupole doublet with small amount of six line patterns, indicating that we found the phase to have magnetic hyperfine fields in the hexagonal structure sample at room temperature. It should be ferromagnetic order. The isomer shifts indicated that the valence states of the Fe ions were ferric (Fe^{3+}). Our research presents direct experimental evidence for ferroism and suggests research of room temperature ferroism is based on the YMn_2O_5 with a simple chemical process.

[1] N. Hur, S. Park, P. A. Sharma, J. S. Ahn, S. W. Cheong, Nature 429, 392 (2004).