

## Magnetic properties of helimagnetic $\text{YMn}_{2-x}(\text{Fe,Co})_x\text{O}_{5-\delta}$ ( $0.0 \leq x \leq 1.0$ ) for the room temperature ferroism

In-Bo Shim,<sup>a)</sup> Jai Hoon Yeom, Kang Ryung Choi, and Chul Sung Kim

*Department of Physics, Kookmin University, Seoul 136-702, Korea*

Hyun Jung Shin

*Department of Material Science and Engineering, Kookmin University, Seoul 136-702, Korea*

Sung Yong An

*Department of Physics, Colorado State University, Fort Collins, Colorado 80523*

(Presented on 8 January 2004)

The structural, electrical, and magnetic properties of the  $\text{YMn}_{2-x}(\text{Fe,Co})_x\text{O}_{5-\delta}$  ( $0.0 \leq x \leq 1.0$ ) pseudobinary oxides have been studied utilizing x-ray diffraction, atomic force microscopy, and magnetic measurements. Our interest in these oxides begins with the hypothesis that both ferroelectric and ferromagnetic properties coexist (a condition known as “ferroism or multiferroism”) in these oxides. Pure and (Fe,Co)-doped  $\text{YMn}_2\text{O}_{5-\delta}$  series have been successfully prepared by means of the sol-gel process. The samples with  $\text{YMn}_{1.8}\text{Fe}_{0.2}\text{O}_{5-\delta}$  and  $\text{YMn}_{1.8}\text{Co}_{0.2}\text{O}_{5-\delta}$  composition display a room temperature spontaneous polarization (ferroelectric) and magnetization (ferromagnetic). The ferroism responses in (Fe,Co)-doped  $\text{YMn}_2\text{O}_{5-\delta}$  series present an opportunity to create and implement spintronics devices that actively couple the ferromagnetic and ferroelectric order parameters. © 2004 American Institute of Physics.

[DOI: 10.1063/1.1689091]