

## The study of superexchange interaction of ordered $\text{Li}_{0.5}\text{Fe}_{1.0}\text{Rh}_{1.5}\text{O}_4$

Kun Uk Kang · Chul Sung Kim

Published online: 14 November 2006  
© Springer Science + Business Media B.V. 2006

**Abstract**  $\text{Li}_{0.5}\text{Fe}_{1.0}\text{Rh}_{1.5}\text{O}_4$  has been studied by X-ray diffraction, Mössbauer spectroscopy. The crystal structure is characterized by the additional reflection (200) that is described by 1:1 ordered structure of Li, Fe at tetrahedral (A) site and can be assigned to the space group  $F\bar{4}3m$ . The lattice constant ( $a_0$ ) is 8.4348 Å. The temperature dependence of the magnetic hyperfine field is analyzed by the Néel theory of ferrimagnetism. The inter-sublattice superexchange interaction is found to be antiferromagnetic with a strength of  $J_{A-B} = -3.78 k_B$  while the intra-sublattice superexchange interactions are ferromagnetic with strengths of  $J_{A-A} = 5.40 k_B$  and  $J_{B-B} = 7.39 k_B$ . The Debye temperatures of the tetrahedral and octahedral sites are determined to be 388 and  $464 \pm 3$  K, respectively, and the Néel temperature has been found to be  $260 \pm 3$  K.

**Key words** Superexchange interaction · Mössbauer spectroscopy · Debye temperature · Lithium ferrites