Mössbauer studies of $BaFe_{11.9}Mn_{0.1}O_{19}$ by a sol–gel method

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$BaFe_{11.9}Mn_{0.1}O_{19}$ powders were prepared by a sol–gel method. Magnetic and structural properties of the powders were characterized by Mössbauer spectroscopy, x-ray diffractometry, and vibrating sample magnetometry. X-ray diffraction and Mössbauer measurements showed that the $BaFe_{11.9}Mn_{0.1}O_{19}$ had an *M*-type hexagonal structure with $a_0 = 5.900$ Å and $c_0 = 23.219$ Å. Mössbauer spectroscopy was performed at various temperatures ranging from 13 to 800 K, and each spectrum for a temperature below the Curie temperature ($T_C = 775 \pm 5$ K) was fitted with five subspectra of Fe sites in the structure ($4f_{VI}$, $2a$, $4f_{IV}$, $12k$, and $2b$). The area fractions of the subspectra at 13 K were 18.0%, 10.2%, 17.5%, 46.1%, and 8.2%, respectively. The $2b$ site had a very large quadrupole splitting. The isomer shifts indicated that the valence state of the Fe ions was ferric (Fe^{3+}). The saturation magnetization M_s was 58 emu/g, and coercivity H_c was 5141 Oe at room temperature under an applied field of 15 kOe.
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