RECENT MÖSSBAUER STUDIES ON $NiFe_2O_4$ AND $Ni(Zn)Fe_2O_4$ FERRITES

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We present recent results on the Mössbauer studies of $NiFe_2O_4$ and of $Ni_{1-x}Zn_xFe_2O_4$ (x = 0.0, 0.2, 0.4, 0.6, 0.8 and 1.0) ferrites, which were synthesized by high-energy mechanical milling and by solid-state reaction methods. This work is mainly motivated by the accurate determination of the cation distribution in Ni and in Ni-Zn ferrites using the simple room-temperature Mössbauer spectrometry. This calculation is known to be very important, because it determines the physicochemical properties of the ferrites. For the cation distribution, we determined the room-temperature recoilless *f*-factors ratio of the Fe^{3+} cations at octahedral [B] and tetrahedral (A) sites for $NiFe_2O_4$ by using formulas proposed by us. For that purpose, we first explore different procedures of synthesis based on the high-energy mechanical milling [1] and on the solid-state reaction [2] methods of stoichiometric mixtures of nickel oxide and hematite. The most pure, crystalline and with large grain-size sample was then used for the determination of the f_B/f_A ratio, which was found to be equal to 1.09 ± 0.01 [3]. This value differed from the normally used value of 0.94. Afterwards, we used it to calculate the cation distribution in $Ni_{1-x}Zn_xFe_2O_4$ ferrites [4]. The Zn content at tetrahedral sites were also calculated from the intensities of the A1g Raman bands and from the intensity ratio of certain Bragg peaks (I(2 2 0)/I(4 4 0) and I(4 0 0)/I(2 2 0)) in the XRD patterns [5]. The values were compared considering the different approximations required by each technique.

References

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