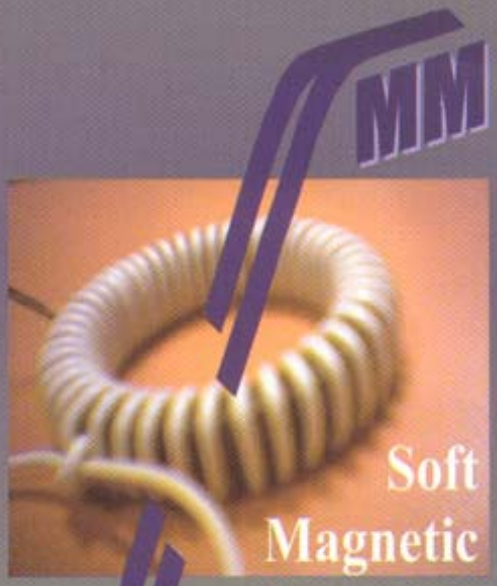

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GROWTH OF MULTIFERROICS $BiFeO_3$ THIN FILMS BY SOL-GEL METHOD

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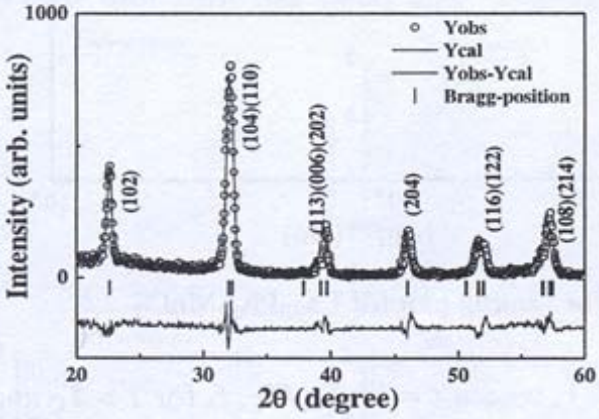
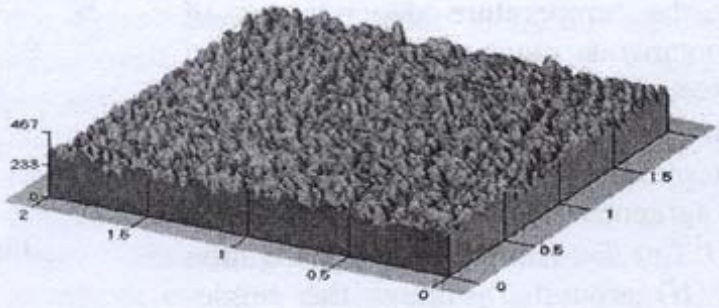
Previously, bismuth ferrite have been widely studied and interested because the multiferroic perovskite $BiFeO_3$ has high antiferromagnetic transition temperature (T_N = 643 K) and also high ferroelectric Curie temperature (T_C = 1103 K) [1]. The growth of $BiFeO_3$ thin films on thermally oxidized silicon substrates is introduced using the sol-gel method, and a study of their microstructure and magnetoelectrics properties is presented by using an XRD, TGA-DTA, AFM, DSC, and AES. The diffraction patterns were refined by Rietveld profile analysis using the FULLPROF program, with the peak shapes approximated by a pseudo-Voigt function. The crystal structure of the $BiFeO_3$ at room temperature, was determined to be rhombohedral of *R*3*c* space group with its lattice constants $a_0 = b_0 = 5.5728$ Å, $c_0 = 13.8412$ Å, respectively. The Bragg factor R_B and R_F were 8.79 % and 4.85 %, respectively. SEM pictures reveal that the matrix is uniform and no segregation of impurity phase was detected.





The grain size was about 50 nm. AES analysis indicated that the sample is chemically homogeneous with Bi/Fe atomic percent ratio being close to 1 and there was no observation of inter-diffusion between the ferrite film and the substrate. The AFM images and the line scan of film. In this case of BFO, the RMS value and average value for the surface roughness of film was 27.3 Å. The DSC curve indicates a phase transition at a temperature of 354 °C. This is an indication of the existence of a structural change in $BiFeO_3$ occurring near the antiferromagnetic to paramagnetic phase transition (Néel temperature). Also, the ferroelectric hysteresis loop shows the electric polarization of the samples.

[1] PALKAR, V. R. – JOHN, J. – PINTO, R.: Appl. Phys. Lett., **80** (9), (2002), 1628

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