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August 29, 2018 1 The effect of heating the composite material BSF and BST varying temperatures for magnetic properties created by the method of mechanical Alloying. Novizal1*), Joniwarta, Mutia Anissa Marsya 1 Departement of Industrial Engineering, Faculty of Engineering, Ubhara Jaya University, Jakarta 2 Departement of Environmental Engineering, Faculty of Engineering, Ubhara Jaya University.

, Jakarta 3 Department of chemical Industrial Engineering, Faculty of Engineering, Ubhara Jaya University, Jakarta E-mail : novizal@ubharajaya.ac.id Abstract In this research carried out investigations on the magnetic properties of the composite BSF-BST (ferromagnetic and ferroelectric) prepared by the method of milling and sonication. The result of the basic material milling BSF and BST process and obtained particle size for the material was nearly 20- 4 µm .

Analyzed by X-Ray Crystal size of 27 nm was found in B7S3T, to B7S3F in which mean crystallite size of only 18 nm. Morphology of composite particles can be seen from the results of SEM. Heating at 1000 and 1100oC temperature for 2 hours and its the magnetic properties changes of the material BSHF is indicated to changes in the intrinsic coercivity of 320.4 kA / m to 126 kA / m and the rising value of remanence Mr, also an increase in the saturation value Ms from 0.1263 to 0.1662 T.

And we hope this materials can be promoted as multiferroic material. Key word : Magnetic properties, (Ba,Sr) hexaferrite, (Ba,Sr) Titanate, ball milling, particle size. 1. Introduction Studies of multiferroic phenomena have been driven by novel materials.

For potential device applications, there is a continued push to develop materials with magnetic transitions above room temperature. Presently, type II multiferroics with strong coupling between ferroelectric and magnetic order parameters appear very promising. Theory has been playing an increasing role in predicting new materials with strong coupling between ferroelectric and magnetic order parameters [1].

Among the multiferroic materials, if the material is composed of ferromagnetic and ferroelectric, better known as Magnetoelektrik (ME). In These materials we can expect the coupling between the magnetic and ferroelectric properties as well as their control by the application of magnetic and / or electric fields [2]. Magneto-electric materials have great potential for applications in actuators and sensors with high sensitivity.

However, there are very few natural magneto-electrics that exhibit both ferromagnetic and ferroelectric behavior at room temperature [3]. This is because the distortion is very large off-center on the ferroelectric behavior is usually not in accordance with the d-level, partially filled which is a prerequisite for ferromagnetic behavior [4]. Magnetoelektrik materials typically synthesized by sintering routes such as sintering solid.

2 In this research, observation of the material Barium strontium titanate, BaSrTiO3 (denoted as BST), and Barium Strontium hexaferit, with the chemical formula BaSrFe12O19 (denoted as BSF) at temperatures of 1000 and 1100oC, and analyzed by PSA, X-Ray diffraction, SEM and Permagraph. Perovskite ferroelectric material widely studied and considered a good material, used in piezoelectric applications [5].

At high temperatures BaSrTiO3 adopt ferroelectric per cubic phase where large barium ions surrounded by 12 nearest neighbor oxygen and titanium ions each have six oxygen ions in octahedral coordination. Ferromagnetic materials BSHF is one of the magnetic material of the most robust, widely used in permanent magnets, magnetic recording media, and microwave applications, because it is quite large anisotropy of crystal magneto, the Curie temperature is high, the magnetization is relatively large, as well as stability excellent chemical and corrosion resistance[5]. BSF crystallizes in a hexagonal structure with 64 ions per unit cell at 11 locations of different symmetry.

24 Fe 3+ atoms are distributed over five different sites: three octahedral sites (12k, 2a, and 4f2), one of the tetrahedral sites (4f1), and a bi pyramid sites (2b). the crystal

structure is called magneto structure, which can be described as a stacking sequence of basic blocks S and R plumbed [6] . In this study expected to look different of structural and magnetic properties of maerial composites with composition Ba(1-x)Sr(x)TiO3-Ba(1-x)Sr(x) Fe12O19 composite system (containing 50 wt.% (Ba(1-x.)Sr(x)Fe12O19) and 50% by weight (Ba(1-x)Sr(x)TiO3), with the notation (B(1-x)SXF) - (B(1-x) SxT) for x = 0.3, 0.5, 0.7

at 1000 and 1100oC [7]. 2. Numerical Method From the process of milling, followed by particle measurement of composite material (BSF- BST) with PSA (Particle Size Analyzer). Additional analysis by XRD was performed on un overlapping diffraction peak employing step scanning and calculation for crystallite size determination using Debye Scherer formula[3], [8]. d 0.x

/ x s (1) wherd tmeacrae iz is he -ray waleh,ß tfuwh lf mam FM)oa iffriopeaercoectfo rmeapeak o(exprsed ria,? tBrang bradening to tstain neglected. The surface morphology and grain distribution is done by using SEM (scanning electron microscope). Measurements carried out on coercivity magnetic properties, the magnetic moments and the values of remanence was recorded at room temperature.

Measurements of electrical Magneto performed as discussed in our previous report[9], [10]. 3. Results and Discussion The particle size and the investigation stating the respective size of the base material is composite (B(1-x) SXF and B(1-x)SXT (where x = 0.3) in the analysis using PSA obtained particle size 4- 20 m ittvariomil10 urfo60 urIluded Fe is the average value of the crystal (or grain) size of the material is milled sintered to each sample B(1-x) SXT and B(1-x)SXF.

the crystal size of 27 nm was found in B7S3T when compared with B7S3F the size of the crystals are only 18 nm. the results for both mean particle and crystal size of the two types of samples, and clearly indicates that the material ispromoted by mechanical alloying are in the area of nano in which materials with size below ~ 30 nm are commonly found in B(1-x) SXF and below ~ 20 nm in the sample B7S3T.

3 Figure 2 is a diffraction results for samples with a ratio of 1: 1 composition between B(1-x)SXT and B(1-x) SXF (where x = 0.3, 0.5, 0.7) is a composite material. All of the diffraction peaks were identified and found that the intensity is composed of a mix between a diffraction intensity B(1-x) SXT and that of B(1-x) SX F. No other picture that was found and thus sintering at 1000oC and 1100oC for 2 hours with composite materials has produced a two- phase mixture consisting of Ba(1-x)SXT and that of Ba(1-x)SXF phase.

We have repeated the same procedure for the average particle and crystal size determination and evaluation results are summarized in Figure 3. Figure. 1. Mean Crystallite ( ) and Mean Particle ( ) sizes of B7S3T and B7S3F prepared by mechanical alloying Crystallite nucleation during sintering at 1000oC for 2 hours is determined by the size of the particle but with the level of size reduction is low, as seen in Figure 1, the mean crystal size to B7S3T is about 350 times smaller than the average size of the particles composite particles and to B7S3F crystal size is about 700 times smaller than the average particle size. Figure 2.

X ray diffraction patterns for (Ba(1-x)Sr(x)Fe12O19)-(Ba(1-x)Sr(x)TiO3) composite on 1000oC conventionally sintered 0.000 5.000 10.000 15.000 20.000 25.000 0 10 20 30 40 50 60 70 0 10 20 30 40 50 60 70 Crystallite size (nm) Milling time (hrs) B7S3F B7S3T B7S3F B7S3T Particle size (µm) Particle Crystallite 0 500 1000 1500 2000 2500 0 20 40 60 80 100 120 Intensity (cps) 2 ? Composite (where x = 0.3, 0.5, 0.7) on 1000o C B3S7F-B3S7T (0307) B5S5F-B5S5T (0505) B7S3F-B7S3T (0703) BSF-BST BSF-BST BSF-BST BSF-BST BSF-BST BSF-BST X = 0.3 x = 0.5 X = 0.7

4 X-ray diffraction pattern of the composite (Ba(1-x)Sr(x)Fe12O19)-(Ba(1-x)Sr(x)TiO3) (where x = 0.3, 0.5, 0.7), diffraction sintered material are shown in Figures 2 and 3. All peaks can be indexed as each phase B(1-x) SXT (ferroelectric) and B(1-x)SXF (ferromagnetic). Interestingly, no differences were noted in the peak position for conventional sintering (CS), and except for a few changes in peak intensity Figure 3.

X ray diffraction patterns for (Ba(1-x)Sr(x)Fe12O19)-(Ba(1-x)Sr(x)TiO3) composite on 1100oC conventionally sintered Figure 4 shows the results of SEM, from conventional sintered composite samples (Ba (0.7) Sr (0.3) Fe12O19) - (Ba (0.7) Sr (0.3) TiO3). It is observed that the grains are distributed evenly across the sample. Grain samples are formed in a more compacted. In addition, the presentation of a sample, all grain BST and BSHF maintained, causing splinters / good surface.

These results indicate that short period of detention is an important factor to get 0.5B7S3T-0.5B7S3F composites with a uniform and fine grains with a conventional sintering process. Figure 4. The SEM images of a). Composite B7S3F – B7S3T , b.).B7S3F, c.).B7S3T 0 500 1000 1500 2000 2500 0 20 40 60 80 100 120 Intensity (cps) 2 ? Composite (where x = 0.3, 0.5, 0.7) on 1100o C B3S7F- B3S7T (0307) B5S5F- B5S5T (0505) B7S3F- B7S3T (0703) b.).B7S3F a). Composite B7S3F – B7S3T c.).B7S3T 5 In pictures 5 and 6 below show that the effect of the sintering temperature of the composite materials B (1-x) SXF-B (1-x) SXT with variations of x = 0.3, 0.5, 0.7. the sintering temperature of 1000o C in getting value composite magnetic properties are listed in Table 1, and sintering temperature 1100oC in Table 2.

Table 1. The value of magnetic properties influence of sintering temperature 1000oC Material Ms Mr Mr/Ms Hcj Hmax [T] [T] % kA/m kA/m B3S7T-B3S7F 0.1011 0.0773 0.76459 330.7 1032 B5S5T-B5S5F 0.1171 0.0843 0.719898 318.1 1279 B7S3T-B7S3F 0.1263 0.0887 0.702296 320.4 1247 Figure 5 . The composite with variation of composition x = 0.3, 0.5, and 0.7 influenced on sintering temperature 1000oC Figure 6 .

The composite with variation of composition x = 0.3, 0.5, and 0.7 influenced on sintering temperature 1100oC -0.2 -0.15 -0.1 -0.05 0 0.05 0.1 0.15 0.2 -1500 -1000 -500 0 500 1000 1500 J[T] [kA/m] (BST)-(BSF) (where x = 0.3, 0.5, 0.7) on 1000oC BST- BSF 0307 BST-BSF 0505 BST-BSF 0703 x = 0.5 x = 0.7 x = 0.3 -0.2 -0.15 -0.1 -0.05 0 0.05 0.1 0.15 0.2 -1500 -1000 -500 0 500 1000 1500 J[T] [kA/m] BST-BSF (where x= 0.3.0.5, 0.7) on 1100oC B3S7F- B3S7T (0307) B5S5F- B5S5T (0505) B7S3F- B7S3T (0703) x = 0.5 x = 0.7 x = 0.3 6 Table 2.

The value of magnetic properties influence of sintering temperature 1100oC Materials Ms Mr Mr/Ms Hc Hmax [T] [T] % kA/m kA/m B3S7T-B3S7F 0.1306 0.0791 0.605666 315.328 1161 B5S5T-B5S5F 0.1500 0.0943 0.628667 230.435 1343 B7S3T-B7S3F 0.1662 0.1291 0.776594 126.193 1471 There has been growing interest in the study of multiferroic materials, a special class of materials in which two or three kinds of order parameters i.e.,

ferroelectric, ferromagnetic and ferroelastic The multiferroic of the composite material indicated not also with magnetic properties but also with electric properties. Figure 6 . Electric properties of composite with variation of composition x = 0.3, 0.5, and 0.7 5. Conclusion The influence of temperature on material BSF-BST with composition x = 0.3, 0.5, 0, heated at 1000 and 1100oC give effect to the magnetic properties, is indicated by the change in the value of coercivity, decreased from 320 kA / m up to 126 193 kA / m, as well as increase the value of remanent 0.1291 [T], and the saturation value reached 0.1662 [T].

Referensi [1] D I Khomsii, “Mioics: dntay tmbine magis,” v pp. 1 – 14, 2004. [2] S. H. Baek et al. , “Flasic sitngr nancale no -volatile magnetoelectric dev,” v 9o.brua, p 30 – 314, 2010. [3] G. Sadullahoglu et al. , “fect milngime aintingemperaton crystallization of BaFe12O19 phase and magnetic properties of ba-hexaferrite mag,” Acta Phys. Pol. A, vol. 128, no. 3, pp.

377 – 382, 2015. Electric Field (kV/cm) Polarization (μC/cm 2) 10 -20 -10 0 20 10 0 20 10 7 [4] Noval, Mnd M Hik, “Ef oferat Ba (-x) Crystallite Size Cerizion Propeies Softagic, Int. J. Sci. Res., vol. 14, no. 1, pp. 88 – 92, 2014. [5] R.ay.al, kutor Aced Mcri,” Ceram. Int.,

2016. [6] I Bs H.ahm, “Mnet sructproiesf BaFe2 -xGaxO19 nanopart,” J. Alloys Compd., vol. 489, no. 1, pp. 110 – 114, 2010. [7] N. Frey Hei, S.inat, H.ikh, aN.

D, “Mrosructre and magnetism in barium strontium titanate (BSTO)-barium hexaferrite (BaM) multers Mater. Res. Bull., vol. 40, no. 8, pp. 1286 – 1293, 2005. [8] A. Farhadiz, S. Seyhimnd S.M Moudpanah, “Mnetd microwave absorption properties of ZnCo-substituted W- tpe srontum hexrit J. Magn. Magn. Mater., vol. 382, pp. 233 – 236, 2015. [9] R. Nowosielski, R.ilas.ercz L.jakW.owk “Mosruct and magic proies BaFe2 O pow,” v.no., p 51 – 54, 2008. [10] K. M. U. Rehman et al.

, “Sntizion aagetrt of -xYxFe12O19 Hexaferrites Prepared by Solid- Ste React Mhod,” J. Magn. Magn. Mater., 2016.

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