attributed to the change of magneto crystalline anisotropic field that finally lead the change of the spin resonance and its natural frequency due to the fully phase transformation from $BaFe_2O_4$ with an orthorhombic structure became $BaSrFe_4O_8$ with a trigonal structure (Cheng & Ren, 2016).

CONCLUSION

In conclusion, a series of Barium Monoferrite modified by Strontium cation (Sr^{2+}) as RAM candidate in the form of

$Ba_{(1-x)}Sr_{(x)}Fe_2O_4$ ($0.0 \leq x \leq 0.5$) have been successfully synthesized by using solid state reaction method with high energy milling technique. The XRD patterns and Raman spectra show that along with the increasing Sr^{2+} substitution makes the crystal structure changed from the initial phase of $BaFe_2O_4$ that had orthorhombic structure became $BaSrFe_4O_8$ that had trigonal structure. Referring to the magnetic properties measurement using VSM, all compositions show ferromagnetic properties with the largest coercivity value belong to the composition of $Ba_{(1-x)}Sr_{(x)}Fe_2O_4$ (x = 0.1). This composition also exhibits the widest frequency range for reflection loss (RL) less than -20 dB with the peak value of RL in the frequency 11.16 GHz for -38.25 dB. Thus, the composition of $Ba_{(1-x)}Sr_{(x)}Fe_2O_4$ (x = 0.1) shows a prominent results to be applied as a main compound of RAM.

ACKNOWLEDGEMENT

The authors acknowledge the support from the Research fund (DIPA) of Center for Science and Technology of Advanced Materials – National Nuclear Energy Agency of Indonesia (PSTBM-BATAN).

REFERENCES

Liu, Y., Lian, L. X., Ye, J. (2011). Electromagnetic wave absorption properties of RE-Fe nanocomposites. In Petrin, A. (Ed.) *Wave Propagation* (pp.354-378) InTech, Available from: https://www.intechopen.com/books/wave-propagation/electromagnetic-wave-absorption-properties-of-re-fe-nanocomposites

Hazra, S., Ghosh, B. K., Patra, M. K., Jani, R. K. (2015). A novel 'one-pot' synthetic method for preparation and study of their microwave absorption and magnetic properties. *Powder Technology*. 279, 10–17.

Shen, X., Song, F., Xiang, J., Liu, M., Zhu, Y. (2012). Shape anisotropy, exchange coupling interaction and microwave absorption of hard/soft nanocomposite ferrite microfibers. *Journal of the American Ceramic Society*. 95, 3863–3870.

Tyagi, S., Baskey, H. B., Agarwala, R. C., Agarwala, V. (2011). Development of hard/soft ferrite nanocomposite for enhanced microwave absorption, *Ceramics International*. 37, 2631–2641.

Weimo, Z., Lei, W., Rui, Z., Jiawen, R., Guanzhong, L. (2011). Electromagnetic and microwave-absorbing properties of magnetic nickel ferrite nanocrystals. *Nanoscale*. 3, 2862-2864.

Cheng, Y., and Xiaohu, R. (2016). Enhanced microwave absorbing properties of La^{3+} substituting barium hexaferrite. *Journal of Superconductivity and Novel Magnetism*. 1-6.

Teber, A., Cil, K., Yilmaz, T., Eraslan, T., Uysal, D. (2017). Manganese and zinc spinel ferrites blended with multi-walled carbon nanotubes as microwave absorbing materials. *Aerospace*, 1-18.

Ghasemi, A., Sepelak, V., Liu, X., Morisako, A. (2009). Microwave absorption properties of Mn–Co–Sn doped barium ferrite nanoparticles. *IEEE Transactions on Magnetics*. 45(6), 2456-2459.

Gunanto, Y. E., Cahyadi, L., Adi, W. A. (2016). Effect of Mn and Ti substitution on the reflection loss. *AIP Conference Proceedings*. 19, 2–8.

Candeia, R. A., Souza, M. A. F., Bernardi, M. I. B., Maestrelli, S. C. 2006. Monoferrite $BaFe_2O_4$ applied as ceramic pigment. *Ceramics International*. 33, 521-525.

Borse, P. H., Cho, C. R., Lim, K. T. (2011). Synthesis of Barium Ferrite for visible light photo-catalysis applications. *Journal of the Korean Physical Society*. 6, 1672–1678.

Mulyawan, A., Adi, W., Ari., Fisli, A. (2017). The phase transformation and crystal structure studies of Strontium substituted Barium Monoferrite. *IOP Conference Series : Earth and Environmental Science*. 58,1-10.

Lazarević, Z. Ž., Jovalekić, Č., Sekulić, D., Slankamenac, M., Romčević, M. (2012). Characterization of nanostructured spinel $NiFe_2O_4$ obtained by soft mechanochemical synthesis. *Science of Sintering*. 44(3), 331–339.

Li, C. J., Bin, W., Jiao-Na, W. (2012). Magnetic and microwave absorbing properties of electrospun $Ba(1-x)LaxFe_{12}O_{19}$ nanofibers. *Journal of Magnetism and Magnetic Materials*. 324, 1305–1311.

Novizal, Manaf, A., Fajrah, M. C. (2016). The effect of induced magnetic anisotrophy on the hysteresis parameter of nano barium strontium hexaferrite prepared by mechanical alloying and sonication. *International Journal of Technology*. 3, 486–492.

Li, J. Zhang, H., Liu, Y., Li, Q., Zhou, T., Yang, H. (2015). Phase formation, magnetic properties and raman spectra of Co-Ti co-substitution M-type barium ferrites. *Applied Physics A: Materials Science and Processing*. 119(2), 525–532.

Chen, I-. H., Wang, C-. C., Chen, C-. Y. 2010. Fabrication and characterization of magnetic cobalt ferrite/polyacrylonitrile and cobalt ferrite/carbon nanofibers by electrospinning. *Carbon*. 48, 604-611.

Andreasson, J., Holmlund, J., Knee, C. S., Käll, Mikael., Börjesson, Lars. (2007). Franck-Condon higher order lattice excitations in the LaFe1−xCrxO3 (x=0, 0.1, 0.5, 0.9, 1.0), perovskites due to Fe-Cr charge transfer effects. *Physical Review B*. 75, 104302(1-8).

Yang, Y., Yu-Long, L., Ke, Z., Li-Yan, Z., Shu-Yuan, M. (2010). Structural Properties of $Bi_{1-x}La_xFeO_3$ Studied by micro-Raman Scattering. *Chinese Physics*. 3, 1–6.

Lamichanne, M., Rai, B. K., Mishra, S. R., Nguyen, V.V., Liu, J. P. (2012). Magnetic properties hard-soft SmCo5-FeNi and SmCo5-FeCo composites prepared by electroless coating technique. 2, 119–124.

Kanagaraj, M., Kokila, I. P., Subbulakshmi, N., Kumar. (2016). A systematic investigation of structural, optical and magnetic properties of pristine. *Indian journal of Pure and Applied Physics*. 54, 500–506.

Sivakumar, P., Ramesh, A., Ramanand, A., Ponnusamy, A., Muthamizhzhelvan, C. (2013). Synthesis and characterization of $NiFe_2O_4$ nanoparticles and nanorods. *Journal of Alloys and Compounds*. 563, 6–11.

Jiaoqiang, Z., Changming, S., Tiezheng, J., Guanglei, W., Kaichang, K. (2014). preparation and microwave absorbing characteristics of multi-walled carbon nanotube/chiral-polyaniline composites. *Open Journal of Polymer Chemistry*. 4, 62–72.

Jingbo, G., Yuping, D., Lidong, L., Liyang, C., Shunhua, L. (2011). Electromagnetic and microwave absorption properties of Carbonyl-Iron / Fe91Si9 composites in gigahertz range. *Journal of Electromagnetic Analysis and Applications*. 3, 140–146.