Synthesis and Magnetic Characterization of M-type $Sr_{0.75-x}La_{0.25}Ca_xFe_{11.8}Co_{0.2}O_{19}$ hexaferrite by Salt-assisted Ultrasonic Spray Pyrolysis (SA-USP)

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Strontium M-type hexaferrite has widely used in electronic industryas a permanent magnet due to its relatively high intrinsic coercivity and chemical stability. Recently, many attemptssuch as cationic substitution have been made to increase the magnetic performance of the ferrite. It has beeninvestigated that substituting La^{3+}-Co^{2+} with Sr^{2+}-Fe^{3+} in hexaferrite can improve the magnetic properties resulting from the change of magnetic moments.

However, it isnecessary to reduce material cost because strontium and lanthanum are rare and these elements cause the cost increase. Calcium, which has same oxidation state with strontium, is more abundant geochemically and also cheaper than strontium. In addition, it was reported that partial Ca^{2+} substitution with Sr^{2+} in the strontium hexaferrite can increase the coercivity. Therefore substituting Ca^{2+} in La^{3+}-Co^{2+} substituted strontium ferrites is a great solution to both reduce the cost and enhance the magnetic properties.

In this study, $Sr_{0.75-x}La_{0.25}Ca_xFe_{11.8}Co_{0.2}O_{19}$ ($0 \leq x \leq 0.75$) hexaferrites were synthesized by salt-assisted ultrasonic spray pyrolysis (SA-USP) process. SA-USP was adopted to synthesize non-agglomerated hexaferrite particles with high uniformity. Both the structural and magnetic properties of the particles with different molar concentration of Ca^{2+} have been investigated systematically.

Keywords: M-type Strontium hexaferrite, Calcium substitution, La-Co substitution, Salt assisted ultrasonic spray pyrolysis (SA-USP), Magnetic properties