SINTESIS SENYAWA AURIVILLIUS LAPIS EMPAT CaBi$_4$-xLa$_x$Ti$_4$O$_{15}$ DENGAN MENGGUNAKAN METODE LELEHAN GARAM

SKRIPSI SARJANA KIMIA

Oleh :
RINI RAMADHANI
1310412016

PEMBIMBING I : Dr. Zulhadjri, M. Eng
PEMBIMBING II : Dr. Eng Yulia Eka Putri

JURUSAN KIMIA
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
UNIVERSITAS ANDALAS
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ABSTRACT

SYNTHESIS OF FOUR-LAYERED CaBi₄₋ₓLaₓTi₄O₁₅ AURIVILLIUS COMPOUND BY MOLTEN SALT METHOD

By:
Rini Ramadhani (1310412016)
Dr. Zulhadjri, M.Eng and Dr. Eng. Yulia Eka Putri

Aurivillius phase is a type of metal oxide compound with general formula \([\text{Bi}_2\text{O}_2]^{2+} [\text{A}_n\text{B}_m\text{O}_3n+1]^{2-}\) consisting of perovskite layer and bismuth layer in a single phase. Aurivillius phase with formula CaBi₄Ti₄O₁₅ has ferroelectric properties and very potential to be developed as reference in the advance material for data-storage. The modification of four layers CaBi₄₋ₓLaₓTi₄O₁₅ \((x = 0; 0.5; 1.0; 1.5 \text{ and } 2.0)\) Aurivillius phase was synthesized using molten salt method. Precursors were weighted stoichiometrically and grinded homogeneously with the eutectic mixture of Na₂SO₄/ K₂SO₄ salts. The mixture of precursors and salts were heated at temperatures of 750 °C and 850 °C for 10 h and 950 °C for 5 h. The products were then characterized by X-Ray Diffractometer (XRD) and Scanning Electron Microscope (SEM). XRD data were refined by Rietica program with Le Bail method. Refinement results revealed the formation of four layers CaBi₄₋ₓLaₓTi₄O₁₅ for all compositions. The single phase of Aurivillius with \(\text{A}_{2}\text{ram}\) space group was shown by the \(x \leq 1.5\). The orthorhombic of the single phase of Aurivillius decrease as the increasing of \(\text{La}^{3+}\) concentration in the sample. The surface analysis by SEM showed that the surface was plate-like in accordance with the unique feature of Aurivillius phase. Raman spectroscopic measurements show a peak shift for each addition of \(\text{La}^{3+}\) variation. Measurement of dielectric properties at room temperature shows an increase in dielectric constant value with an increase of \(\text{La}^{3+}\) to \(x = 1.0\).

Keywords: Aurivillius phase, molten salts, ferroelectric, Le Bail method.