

SINTESIS SENYAWA AURIVILLIUS LAPIS EMPAT $\text{CaBi}_{4-x}\text{La}_x\text{Ti}_4\text{O}_{15}$ DENGAN MENGGUNAKAN METODE LELEHAN GARAM

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PADANG
2017**

ABSTRACT

SYNTHESIS OF FOUR-LAYERED $\text{CaBi}_{4-x}\text{La}_x\text{Ti}_4\text{O}_{15}$ AURIVILLIUS COMPOUND BY MOLTEN SALT METHOD

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Aurivillius phase is a type of metal oxide compound with general formula $[\text{Bi}_2\text{O}_2]^{2+}[\text{A}_{n-1}\text{B}_n\text{O}_{3n+1}]^{2-}$ consisting of perovskite layer and bismuth layer in a single phase. Aurivillius phase with formula $\text{CaBi}_4\text{Ti}_4\text{O}_{15}$ has ferroelectric properties and very potential to be developed as reference in the advance material for data-storage. The modification of four layers $\text{CaBi}_{4-x}\text{La}_x\text{Ti}_4\text{O}_{15}$ ($x = 0; 0.5; 1.0; 1.5$ and 2.0) Aurivillius phase was synthesized using molten salt method. Precursors were weighted stoichiometrically and grinded homogeneously with the eutectic mixture of $\text{Na}_2\text{SO}_4/\text{K}_2\text{SO}_4$ salts. The mixture of precursors and salts were heated at temperatures of $750\text{ }^\circ\text{C}$ and $850\text{ }^\circ\text{C}$ for 10 h and $950\text{ }^\circ\text{C}$ 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 $\text{CaBi}_{4-x}\text{La}_x\text{Ti}_4\text{O}_{15}$ for all compositions. The single phase of Aurivillius with $A2_1am$ space group was shown by the $x \leq 1.5$. The orthorhombic of the single phase of Aurivillius decrease as the increasing of 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 La^{3+} variation. Measurement of dielectric properties at room temperature shows an increase in dielectric constant value with an increase of La^{3+} to $x = 1.0$.

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

