

**EFEK SUBSTITUSI  $Gd^{3+}$  DAN  $Ti^{4+}$  PADA SENYAWA  $SrBi_2Nb_2O_9$   
TERHADAP PERUBAHAN STRUKTUR DAN SIFAT DIELEKTRIK**

**SKRIPSI SARJANA KIMIA**

Oleh

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**PROGRAM STUDI SARJANA**

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**FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM**

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Skripsi ini diajukan sebagai salah satu syarat untuk mendapatkan gelar Sarjana Sains (S.Si) pada jurusan Kimia Fakultas Matematika dan Ilmu

Pengetahuan Alam Universitas Andalas

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## ABSTRACT

### EFFECT OF Gd<sup>3+</sup> AND Ti<sup>4+</sup> SUBSTITUTION IN SrBi<sub>2</sub>Nb<sub>2</sub>O<sub>9</sub> COMPOUNDS ON STRUCTURAL CHANGES AND DIELECTRIC PROPERTIES

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Aurivillius phase-based compounds, which also called Bismuth Layer Structural Ferroelectrics (BLSF) are compounds composed like a sandwich of a perovskite layer  $[A_{n-1}B_nO_{3n+1}]^{2-}$  and a bismuth oxide layer  $[Bi_2O_2]^{2+}$ . Aurivillius compounds which are ferroelectric are widely used as memory storage cells in electronic devices such as RAM (Random Access Memory), NVRAM (Non Volatile Ferroelectric Random Access Memory Device), superconducting materials, and electrocaloric. Synthesis of the compound Aurivillius  $Sr_{1-x}Gd_xBi_2Nb_{2-x}Ti_xO_9$  varied  $x = 0, 0.2, 0.4, 0.6, 0.8$  and 1 mole have been carried out using the molten salt method. The precursors were weighed according to the stoichiometric equation. The ratio of the target compound with a mixture of sulfate salts ( $Na_2SO_4 : K_2SO_4 = 1:1$ ) added to the metal oxide precursor with a mole ratio of product to salt is 1:7. All precursors were ground until homogeneous, then the salt mixture was added and ground again until smooth. The mixture was heated at 750°C for 10 hours followed by 850°C and 950°C for 5 hours, respectively. The resulting product compounds were characterized using XRD (X-Ray Diffraction), SEM (Scanning Electron Microscopy), FTIR (Fourier Transform Infrared Spectroscopy), and LCR (Inductance, Capacitance & Resistance) Meter. The results of the XRD pattern indicate that a single-phase two-layer Aurivillius compound has been produced. The XRD data of the product was refined using the Rietica application and the results obtained that the product compound had an orthorhombic structure with the  $A21am$  space group. The results of SEM analysis show that the surface shape of the product compound is plate-like and anisotropic, which is a characteristic of Aurivillius compounds with particle size decreasing with increasing composition  $x$ . The results of the FTIR analysis showed a shift to a smaller wave number due to the increase in  $Ti^{4+}$  cation substitution and the difference in the strength of the Ti-O bond which was weaker than the Nb-O bond strength. The results of measuring the value of the dielectric constant using the LCR-Meter have decreased which means a decrease in ferroelectric properties. The phase transition temperature and dielectric loss were found to increase with increasing substitution of  $Gd^{3+}$  and  $Ti^{4+}$  cations.

**Keywords** : Aurivillius Phase, Ferroelectric, Molten Salt Method, *Le Bail* Refinement