

# Karakterisasi mikrostruktural material penyerap gelombang elektromagnetik senyawa $\text{LaxBa}(1-x)\text{Fe}0.25\text{Mn}0.5\text{Ti}0.25\text{O}_3$ , ( $x = 0, 0.25, 0.75, 1$ ) = Microstructural characterization of $\text{LaxBa}(1-x)\text{Fe}0.25\text{Mn}0.5\text{Ti}0.25\text{O}_3$ , ( $x = 0, 0.25, 0.75, 1$ ), an electromagnetic wave absorbance material

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## Abstrak

Pertumbuhan butir pada temperatur 1100°C, 1200°C, dan 1300°C kristal  $\text{LaxBa}(1-x)\text{Fe}0.25\text{Mn}0.5\text{Ti}0.25\text{O}_3$  dipelajari. Material sampel dipreparasi menggunakan teknik pengaloyan mekanik (mechanical alloying) dengan waktu penggilingan (high ball energy milling) selama 30 jam. Sintering dilakukan selama 0, 1, 3 dan 6 jam. Material dianalisa menggunakan sinar X. Besar ukuran butir dihitung menggunakan persamaan Debye-Scherrer berdasarkan profil difraksi sinar X-nya. Sifat magnetik diukur menggunakan pemagraf. Sedangkan serapan gelombang mikro diukur menggunakan alat Network Analyzer (VNA) dengan metode Transmission/Reflection Line (TRL). Semua pengukuran dilakukan pada temperatur kamar.

Hasil penelitian menunjukkan bahwa persamaan pertumbuhan butir kristal

$\text{La}0.25\text{Ba}0.75\text{Fe}0.25\text{Mn}0.5\text{Ti}0.25\text{O}_3$  mengikuti model persamaan laju difusi. Hasil serapan gelombang mikro menunjukkan adanya serapan pada frekuensi 11-15 GHz. Serapan ini relatif lebih kecil jika dibandingkan dengan serapan material basisnya yakni  $\text{LaFe}0.25\text{Mn}0.5\text{Ti}0.25\text{O}_3$ . Namun daerah serapannya relatif lebih luas daripada material basis tersebut.

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Growth of  $\text{La}0.25\text{Ba}0.75\text{Fe}0.25\text{Mn}0.5\text{Ti}0.25\text{O}_3$  in the temperature 1100°C, 1200°C, and 1300°C during 0, 1, 3 and 6 hours sintering was investigated. Samples were prepared by mechanical alloying technique with high ball energy milling. Milling time is 30 hours. Sample was analyzed using x-ray diffraction. Grain size was calculated using Debye-Scherrer equation based on their x-ray diffraction profiles. Material absorbance properties was measured using Network Analyzer (VNA) with Transmission/ Reflection Line (TRL) measurement technique. All analysis was conducted in room temperature.

Data showed that grain growth of  $\text{La}0.25\text{Ba}0.75\text{Fe}0.25\text{Mn}0.5\text{Ti}0.25\text{O}_3$  has followed diffusion rate equation model of. Whilst its microwave absorbance measurement data performed its wide absorbance in the frequency range 11-15 GHz. Despite its relatively small absorbance intensity,  $\text{La}0.25\text{Ba}0.75\text{Fe}0.25\text{Mn}0.5\text{Ti}0.25\text{O}_3$  has broader bandwidth comparing to its base material  $\text{LaFe}0.25\text{Mn}0.5\text{Ti}0.25\text{O}_3$ .