

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

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Abstrak

Pertumbuhan butir pada temperatur 1100oC, 1200oC, dan 1300oC kristal  $\text{La}_x\text{Ba}_{(1-x)}\text{Fe}_{0.25}\text{Mn}_{0.5}\text{Ti}_{0.25}\text{O}_3$  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 temperatur e1100oC, 1200oC, dan 1300oC during 0, 1, 3 and 6 hours sintering was investigated. Sampels was prepared by mechanical alloying techique with high ball energy milling. Milling time is 30 hours. Sample was analized 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 it microwave absorbance measurement data performed its wide absorbance in the fequency 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 bandwith comparing to its base material  $\text{LaFe}_{0.25}\text{Mn}_{0.5}\text{Ti}_{0.25}\text{O}_3$ .