Karakterisasi mikrostruktural material penyerap gelombang elektromagnetik senyawa LaxBa(1-x)Fe0.25Mn0.5Ti0.25O3, (x = 0, 0.25, 0.75, 1) = Microstructural characterization of LaxBa(1-x)Fe0.25Mn0.5Ti0.25O3, (x = 0, 0.25, 0.75, 1), an electromagnetic wave absorbance material

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Abstrak

Pertumbuhan butir pada temperatur 1100oC, 1200oC, dan 1300oCkristal LaxBa(1-x)Fe0.25Mn0.5Ti0.25O3 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 La0.25Ba0.75Fe0.25Mn0.5Ti0.25O3 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 LaFe0.25Mn0.5Ti0.25O3. Namun daerah serapannya relatif lebih luas daripada material basis tersebut.
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Growth of La0.25Ba0.75Fe0.25Mn0.5Ti0.25O3 in the temperatur e1100oC, 1200oC, dan 1300oC during 0, 1, 3 and 6 hours sinteringwas 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 La0.25Ba0.75Fe0.25Mn0.5Ti0.25O3 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, La0.25Ba0.75Fe0.25Mn0.5Ti0.25O3 has broader bandwith comparing to its base material LaFe0.25Mn0.5Ti0.25O3.