Analisis Sifat Absorpsi Gelombang Mikro Material La0,7AE0,3MnO3 (AE=Ba, Ca, dan Sr) dengan Metode Sintesis Deposisi Elektroforesis = Analysis Of Microwave Absorption Properties Of The Material La0.7AE0.3MnO3 (AE=Ba, Ca, And Sr) Using Electrophoresis Deposition Method

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Abstrak

Perkembangan teknologi sejalan dengan penggunaan gelombang elektromagnetik yang dapat menimbulkan electromagnetic interference (EMI) yang dapat mengganggu fungsi perangkat elektronik dan kesehatan. Penelitian ini bertujuan membuat material penyerap gelombang elektromagnetik guna meminimalisir dampak negatif EMI tersebut. Diterapkan variasi material La0,7AE0,3MnO3 (AE=Ba, Ca, and Sr) dengan metode sintesis sol-gel (untuk membuat serbuk), kemudian disintesis lebih lanjut dengan metode deposisi elektroforesis (DEF) (untuk membuat film). Hasil refinement pola X-Ray Diffraction (XRD) menunjukkan keseluruhan material memiliki fasa tunggal. Karakterisasi dengan Scanning Electron Microscope (SEM) - Energy Dispervive X-Ray Spectroscopy (EDS) mengkonfirmasi bahwa material film La0,7AE0,3MnO3 (AE=Ba, Ca, and Sr) memiliki morfologi berbentuk spherical berukuran nano dengan persebaran unsur yang homogen. Nilai ukuran partikel terkecil dari sampel film La0,7AE0,3MnO3 (AE=Ba, Ca, and Sr) yaitu 44,755 nm untuk material LSMO (LSMO-F). Seluruh variasi substitusi sampel film menunjukkan sifat ferromagnetik dan soft magnetik berdasarkan hasil karakterisasi Vibrating Sample Magnetometer (VSM). Analisis kemampuan penyerapan terhadap material absober dilakukan menggunakan karakterisasi Vector Network Analyzer (VNA) menunjukkan hasil nilai reflection loss (RL terbaik berada pada material dengan variasi substitusi Sr, baik material serbuk maupun film yaitu memiliki nilai mencapai -19,3 dB pada frekuensi 10,3 GHz dengan lebar bandwidth 0,94 dan nilai through power hingga 98,81% untuk sampel serbuk.

.....Technological developments are in line with the use of electromagnetic waves which can cause electromagnetic interference (EMI) which can disrupt the function of electronic devices and health. This research aims to create material that absorbs electromagnetic waves to minimize the negative impact of EMI. A variation of the La0.7AE0.3MnO3 (AE=Ba, Ca, and Sr) material was applied using the sol-gel synthesis method (to make powder), then further synthesized using the electrophoretic deposition (DEF) method (to make film). The results of the X-Ray Diffraction (XRD) pattern refinement show that the entire material has a single phase. Characterization using Scanning Electron Microscope (SEM) - Energy Dispervive The smallest particle size value of the La0.7AE0.3MnO3 (AE=Ba, Ca, and Sr)film sample is 44.755 nm for LSMO (LSMO-F) material. All variations of film sample substitutions show ferromagnetic and soft magnetic properties based on the results of the Vibrating Sample Magnetometer (VSM) characterization. Analysis of the absorption capacity of absorber materials was carried out using the Vector Network Analyzer (VNA) characterization showing that the best reflection loss (RL) values were in materials with a variety of Sr substitutions, both powder and film materials, which had values reaching -19.3 dB at a frequency of 10.3 GHz. with a wide bandwidth of 0.94 and a through power value of up to 98.81% for powder samples.