

Pengaruh Doping Ba dan Sr terhadap Sifat Penyerapan Gelombang Mikro pada Keramik Lanthanum Manganite $\text{La}_{0.8}(\text{Ba}_{1-x}\text{Sr}_x)_{0.2}\text{MnO}_3$ ($x = 0; 0.5; 0.75; \text{ dan } 1.0$) = Effect of Ba and Sr Doping on Microwave Absorption Properties of Lanthanum Manganite Ceramic $\text{La}_{0.8}(\text{Ba}_{1-x}\text{Sr}_x)_{0.2}\text{MnO}_3$ ($x = 0; 0.5; 0.75; \text{ and } 1.0$)

Faris Taufiqurrahman Wineva, author

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Abstrak

Material keramik Lanthanum Manganite $\text{La}_{0.8}(\text{Ba}_{1-x}\text{Sr}_x)_{0.2}\text{MnO}_3$ berhasil disintesis menggunakan metode sol-gel dengan variasi komposisi doping $x = 0; 0.5; 0.75; \text{ dan } 1.0$. Penelitian terdahulu diketahui material LBMO dan LSMO memiliki sifat penyerapan gelombang mikro di pita frekuensi C-Band dan X-Band. Melalui penelitian ini, sifat penyerapan gelombang elektromagnetik dipelajari pada material lantanum manganit yang diberikan doping Ba (Barium) dan Sr (Strontium) menjadi material LBSMO. Parameter kisi kristal dan ukuran partikel semakin mengecil seiring meningkatnya substitusi Sr daripada Ba. Ukuran rata-rata partikel terkecil diraih variasi $x = 1.0$ senilai 107 nm. Sifat magnetik material menjadi salah satu kriteria penentu sifat penyerapan gelombang mikro. Material teridentifikasi sebagai material magnetik lunak, lalu sifat magnetiknya semakin kuat seiring meningkatnya substitusi Sr daripada Ba. Pada medan magnet 1 Tesla nilai magnetisasi (M) terbaik diraih variasi $x = 1.0$ senilai 58.67 emu/gr. Kemampuan penyerapan gelombang mikro material telah diuji VNA pada frekuensi 7—13 GHz. Hasilnya variasi $x = 0.75$ memiliki kemampuan penyerapan yang terbaik dengan nilai Reflection Loss -7.4 dB pada frekuensi 11.94 GHz. Semakin besar komposisi x , maka peristiwa penyerapan bergeser menuju frekuensi yang semakin tinggi.

.....Ceramic Lanthanum Manganite $\text{La}_{0.8}(\text{Ba}_{1-x}\text{Sr}_x)_{0.2}\text{MnO}_3$ was successfully synthesized using the sol-gel method with variations in composition $x = 0; 0.5; 0.75; \text{ and } 1.0$. Previous research found that LBMO and LSMO materials have microwaves absorption properties in the C-Band and X-Band frequency. The absorption properties of electromagnetic waves were studied here in lanthanum manganite doped with Ba (Barium) and Sr (Strontium) to become LBSMO material. The crystal lattice parameters and particle size decreased with increasing Sr substitution over Ba. The smallest mean particle size achieved by the $x = 1.0$ with value of 107 nm. The magnetic property of the material is one of the criteria for determining the absorption properties of microwaves. The material is identified as soft magnetic material, then its magnetic properties get stronger as the Sr substitution increases over Ba. When 1 Tesla of magnetic field applied, the highest magnetization (M) achieved by the variation $x = 1.0$ with value of 58.67 emu/gr. The material's microwaves absorption capability has been tested by VNA in the 7—13 GHz frequency. The result is that the variation $x = 0.75$ has the best absorption capability with a Reflection Loss value of -7.4 dB at a frequency of 11.94 GHz. The greater the composition of x , the absorption occur shifted towards higher frequencies.