Pengaruh substitusi Mn dan Ti Terhadap Sifat Magneti dan penyerapan gelombang mikro pada bahan strontium hexaferrite = Influence of the substitution of Mn and Ti on Magnetic And microwave absorption properties of strontium bexaferrite material

Tri Wahono, author

Abstrak

Strontium hexaferrite dengan komposisi nominal Sr0.6Fe,-<,..,jMn,TiyO, (x =0, y=; x = 0.4, y= 0.6; x = 0.5, y = 0.5; x = 0.6, y =0.4) disintesa dengan reaksi keadaan padat. Empat komponen serbnk BaCO,, SrCO,, Fe,O,, MnCO,, dan TiO, dicampur menggunakan High Energy Milling selama 10 jam dan disinterring pada 1050'C dalam tekanan atrnosfer selama 15 jam dan pendinginan eli tungku pemanas. X-ray diffraction (XRD), scanning electron microscope (SEM), energy dispersive spectroscopy (EDS), vibrating sample magnetometer (VSM) dan network analyzer digunakan untuk analisa struktur, sifat elektomagnetik dan penyerapan gelombang. Hasil memperlihatkan bahwa identifikasi fasa dengan penghalusan pola difrkasi XRD diperoleh fasa tunggal untuk substitusi Mn-Ti terhadap Sr0.6Fe,o, dengan x ~ y dan multi fasa terbentuk untnk x " y. Analsis mikrostrnktur dengan SEM menunjukkan variasi partikel adalah 2 - 5 um. Evaluasi terhadap karakteristik magnetik mengindikasikan bahwa terjadi penurunan koersifitas dengan kenaikan substitusi ion Mn2+ dan Ti4+ tetapi penurunan yang signifikan diperoleh terhadap saturasi magntetisasi pada substitusi Mn dan Ti dengan x :t: y. Penelitian saat ini menunjukkan penyerapan gelombang, reflection dan transmission dan juga reflection loss pada rentang frekuensi 7-16 GHz. Dilaporkan juga performansi penyerapan pada substitusi Mn dan Tipada strontium hexaferrite.

.....Strontium hexaferrite with nominal compositions Sr0.6Fe,-{"':Y~xTiy03 (x ~ 0, y o=Q; x ~ 0.4, y ~ 0.6; x ~ 0.5, y ~ 0.5; x ~0.6, y ~ 0.4) have been synthesized by solid state reaction. The four components powder were BaCO,, S!CO,, Fe,O,, MnCO,, and Ti02 mixed with High Energy Milling for 10 hours and sintered at I 050'C in the air at atmosphere pressure for 15 hour and furnace cooling. X-ray diffraction (XRD), scanning electron microscope (SEM), energy dispersive spectroscopy (EDS), resonance vibrating sample magnetometer (R· VSM) and vector network analyzer were used to analyze its structure, electromagnetic and microwave absorption properties. The result showed that, phase identification by refinement results ofXRD pattern confirmed single phase was obtained for Mn-Ti substituted Sr0.6Fe20, with x ~ y and multiphase formed for x" y. The microstructure analyses by SEM showed that the varied particle sizes of 2 - - 5 ~-tm. Evaluation on the magnetic characteristic indicated that coercivity decreased as the number ofMn2"~" and Ti +ions increased but significant decrease in saturation magnetization obtained for Mn and Ti substitution with x ::1:- y. Present investigation demonstrates that microwave absorber. reflection and transmission as well as reflection loss in the frequency range 7-16 GHz were derived Absorption performance ofMn and Ti substituted strontium hexaferrite are also reported.