Pengaruh subsitusi Mn pada sifat magnetik Barium Heksaferit = Effect of Mn substitution to magnetic properties of Barium Hexaferrite

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Abstrak

Barium heksaferit disubtitusi Mn, Ba(Fe1-xMnx)12O19, telah diteliti dengan nilai x=0.00, 0.05, 0.10, 0.15, 0.20, 0.30, 0.40 dan 0.50. Sampel dipreparasi dengan metode solid state reaction dengan tahapan milling, kalsinasi dan sintering. Sampel dicampur dari bahan dasar BaCO3, Fe2O3 dan MnO2 kemudian dimilling selama 24 jam dengan atraitor ball mill. Hasil DTA didapatkan ada peak endotermik pada suhu 200°C, 300°C dan 600°C yang berhubungan dengan dehidrasi sampel, dekomposisi MnO2 dan pelepasan CO2 dari BaCO3. Sampel dikalsinasi pada suhu 1200°C selama 2 jam dengan kenaikan suhu 30C/menit.
Hasil XRD setelah setelah kalsinasi menunjukkan bahwa tidak didapatkan lagi fase bahan dasar dan single phase. Hasil refinement dengan rietveld analysis didapatkan nilai parameter kisi a,b dan c. Sampel dikompaksi pada tekanan 5 MPa untuk sampel berbentuk ring dan 8MPa untuk sample berbentuk pellet pada medan magnet. Sampel disinterring pada suhu 1050°C, 1100°C, dan 1200°C selama 2 jam.
Sebelum dicapai suhu sampel ditahan pada suhu 100°C, 300°C dan 600°C masing-masing selama setengah jam. Massa jenis sample diukur dengan metode Archimedes dan didapatkan bahwa massa jenis sample diatas 75% dari massa jenis teori (5.3 gram/cm3). Hasil pengukuran porositas didapatkan bahwa porositas dibawah 10%. Sample diukur sifat magnetiknya dengan permagraph. Didapatkan bahwa remanence dan energy produk berkurang ketika nilai x bertambah.
.....Barium Hexaferit doped Mn, Ba(Fe1-xMnx)12O19, have been investigated for x=0.00, 0.05, 0.10, 0.15, 0.20, 0.30, 0.40 and 0.50. The preparation is carried out by solid state reaction that corresponds to milling, calcinations and sintering. The precursor BaCO3, Fe2O3 and MnO2 were mixed and milled for 24 hours using attraitor ball mill. DTA results shown there were endothermic peak at 200°C, 300°C dan 600°C that corresponds to sample dehydration, decomposition of MnO2 and releasing of CO2 from BaCO3. Samples were calcined at 12000C for 2 hours with increment 30C/minute.
XRD result showed there were no precursor phase and single phase. Lattice parameter obtained through refinement rietveld analysis. Samples were pressed by 5 MPa for ring shaped and 8 MPa for pellet shaped in magnetic field. Sample were sinterred at 1050°C, 1100°C, and 1200°C for 2 hours.
Before reached the sintering temperature was hold at 100°C, 300°C and 600°C for a half hours each.
Density was measured trough arhimedes method and obtained that density was more thant 75 % theoretical density (5.30 gram/cm3). Porosity measurement result were under 10%. The sample magnetic properties was measured using permagraph. The results showed that remanence and energy product decrease as x value increase.