Pengaruh doping Pb dan kadar CaCo3 terhadap pertumbuhan fase superkonduktor BSCCO-2212 = The effect of Pb dopant and CaCo3 to growth phase superconducting BSCCO-2212

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Abstrak

Bahan superkonduktor BPSCCO-2212 dengan kadar CaCO3 1,0 dan 1,10 fraksi mol telah disintesis dengan metode reaksi padatan (solid state reaction method). Sintesis dilakukan selama 10 jam pada suhu kalsinasi (Tk) 800oC dan sintering selama 20 jam dengan suhu (Ts) 830oC. Tujuan penelitian untuk mengetahui pengaruh variasi doping Pb dan Ca terhadap tingkat kemurnian fase superkonduktor Bi-2212 yang terbentuk (fraksi volume (Fv), derajat orientasi (P), dan impuritas (I)). Hasil sintesis dikarakterisasi menggunakan XRD (X-Ray Diffraction) dan SEM (Scanning Electron Microscopy).
Hasil analisis profil XRD oleh sofware Celref menunjukkan variasi doping Pb cenderung meningkatkan fraksi volume (Fv) BSCCO-2212. Fraksi volume (Fv) pada kadar Ca = 1,0 dan Pb = 0 diperoleh 72,60%, Pb = 0,2, diperoleh 74,10%, Pb = 0,4 diperoleh 60,48 %, dan Pb = 0,6 diperoleh 61,90 %. Sedangkan derajat orientasi (P) tertinggi diperoleh dengan doping Pb = 0,6 sebesar 30,62%. Untuk Fraksi volume (Fv) pada kadar Ca = 1,10 dan doping Pb = 0, diperoleh 65,17 %, Pb = 0,2, diperoleh 78,81%, Pb = 0,4 diperoleh 63,29%, dan Pb = 0,6, diperoleh 87,31%. Fraksi volume relatif baik pada sampel kadar Ca = 1,10 dengan doping Pb = 0,6, yaitu 87,31%. Sedangkan derajat orientasi (P) relatif baik pada sampel Ca = 1,10 tanpa doping Pb yaitu 32,76 %.
<hr>Synthesis of BPSCCO-2212 superconducting materials with CaCO3 1,0 and 1,10 mole fraction has been done using solid reaction method. Synthesis conducted with calcination for 10 hours at temperature of 800oC and sintering for 20 hours with sintering temperature 830 0C. Variation Pb dopant was performed to determine the effect on the level of purity of the Bi-2212 superconducting phase is formed (volume fraction (Fv), the degree of orientation (P), and impurity (I)). The samples were characterized using XRD (X-Ray Diffraction) and SEM (Scanning Electron Microscopy).
XRD analysis results showed variation tended to increase the value of the volume fraction (Fv). Value of the volume fraction (Fv) with Ca 1,0 and Pb = 0, obtained 72,60%, Pb = 0,2 obtained 74,10%, Pb = 0,4 obtained 60,48%, and Pb = 0,6, obtained 61.90%. While the value of highest degree of orientation (P) with Pb = 0,6 obtained 30,62%. Volume fraction (Fv) with Ca = 1,10, and dopant Pb = 0, obtained 56,17%, Pb = 0,2, obtained 78,81%, Pb = 0,4 obtained 63,29%, and Pb = 0,6, obtained 87,31%. Volume Fraction relatively well contained in Ca = 1,10 witg Pb dopant 0,6 is 87,31%. While the degree of orientation (P) is relatively well contained in the sample with Ca = 1,10 without Pb dopant is 32,76%.