Pembuatan dan Karakterisasi Film Ba0,5Sr0,5TiO3 Dping Ga2O3 (BGST)

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Abstrak

Film Ba0,5Sr0,5TiO3 doping Ga2O3 (BGST) telah berhasil dibuat di atas substrat Si(111) dengan proses penumbuhan larutan kimia 1 M larutan BGST [(BaxSr1-xTi1-yGay) O3-y/2] dan dilanjutkan dengan spin coating pada kecepatan putar 3000 rpm selama 30 detik. Karakterisasi yang dilakukan berupa struktur mikro menggunakan XRF, XRD dan SEM serta uji sifat ferroelektrik.
Hasil XRF menunjukkan unsur-unsur pembentuk BST telah terdeposit. Sementara hasil XRD pada substrat Si(111) didapatkan nilai parameter kisi untuk BST, BGST (1%, 2% dan 4%) berturut-turut sebesar 3,9469Å, 3,9354Å, 3,8617Å dan 3,7550Å. Adapun bidang hkl yang muncul yaitu (100) untuk sampel BST dan BGST1M1%Si serta bidang (100) dan (110) untuk sampel BGST1M2%Si dan BGST1M4%Si.
Hasil analisa SEM menunjukkan bahwa permukaan film BST maupun BGST dengan variasi doping masih heterogen.
Hasil uji histerisis menunjukkan adanya hubungan yang linear antara nilai polarisasi dengan nilai medan listrik yang diberikan. Nilai polarisasi spontan memiliki hubungan yang berbanding terbalik dengan nilai parameter kisi suatu bahan. Polarisasi spontan hasil perhitungan berdasarkan posisi atom diperoleh untuk BGST1M1%Si, BGST1M2%Si dan BGST1M4%Si berturut-turut 51,6550(µC/ cm2) , (µC/ cm2) dan 56,7375 (µC/ cm2).
A film of Ga2O3 doped Ba0.5Sr0.5TiO3 (BGST) is successfully make on silicon substrate (111) using chemical solution deposition process 1M BGST (BaxSr1-xTi1-yGay)O3-y/2 solution followed by spin coating process with spin velocity 3000 rpm for 30 second. Characterizations conducted are micro structure characterization using XRF, XRD and SEM and ferroelectric property.
The result of XRF shows that the BST forming elements are already deposited. Where as the result of XRD on silicon substrate (111) shows the lattice parameter for BST, BGST (1%, 2% and 4%) are respectively as follow: 3.9469 Å , 3.9354 Å , 3.8617 Å and 3.7550 Å . In addition, the XRD result also show that the hkl plane observed is (100) plane for BST sample and BGST1M1%Si, and (100) and (110) planes for BGST1M2%Si and BGST1M4%Si.
The result of SEM shows that the films surface of BST as well as BGST with various doping concentration are still heterogeneous.
The result of hysterisis test shows the existence of directly proportional relationship between the polarization value and electric field value. The spontaneous polarization value is conversely proportional to the lattice parameter value of material. The spontaneous polarization value obtained from calculation based on atomic position for BGST1M1%Si, BGST1M2%Si and BGST1m4%Si are respectively as follow: 51.6550, 53.6454 and 56.7375 (µC/ cm2).