

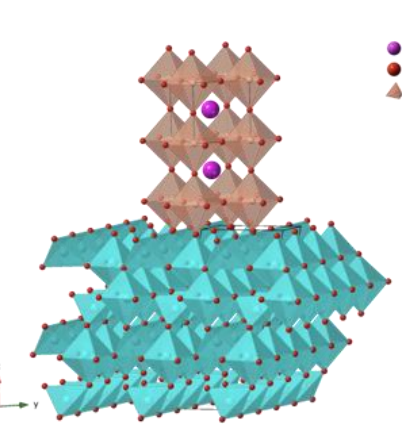
Epitaxial BaTiO₃ on β-Ga₂O₃ (100)



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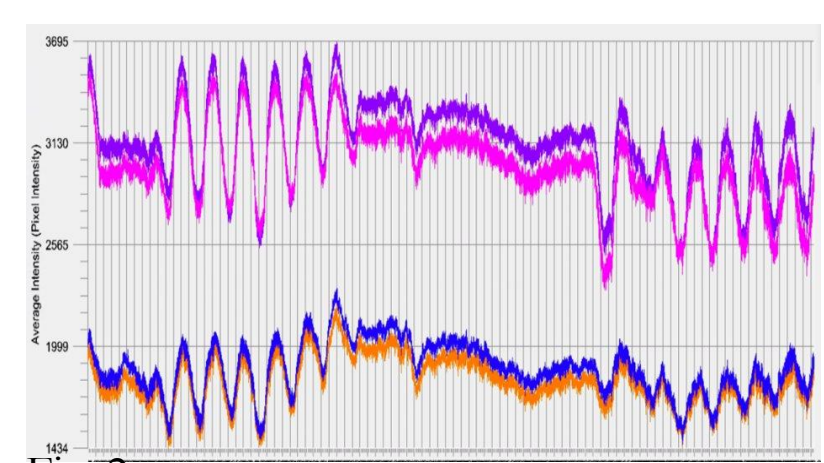
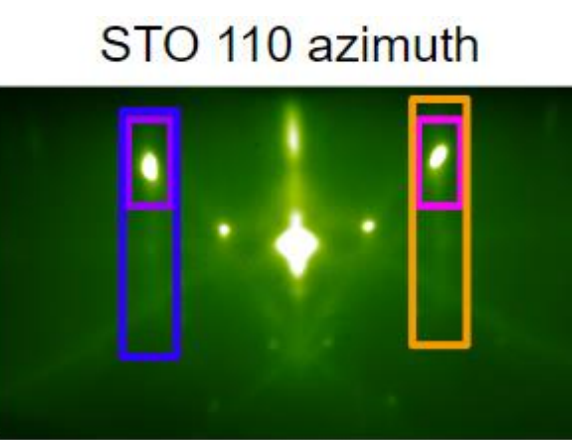
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Abstract & introduction



- Characterization of single crystal β-Ga₂O₃ films grown on SrTiO₃ (100) substrates by MOCVD
- Gallium oxide has a very high bandgap(4.9ev) and a high voltage breakdown
- Barium titanate has a high dielectric constant
- BaTiO₃ has similar properties to SrTiO₃ (Both perovskites)
- BaTiO₃ dielectric improves the breakdown electric field
- Ohio State group demonstrates that their BaTiO₃/Ga₂O₃ heterojunction diode to have a breakdown electric field of 5.7 MV/cm
- Goal: Epitaxial BaTiO₃ grown on β-Ga₂O to have a breakdown electric field that overcome 5.7 MV/cm

Experiment



Using MBE, we calibrated Barium flux and titanium flux to get a 1 to 1 ratio (stoichiometry) of BTO by measuring the average intensity of the points in fig 1. from peak to peak or trough to trough. We check this calculation with Rheed and XRD.

Results

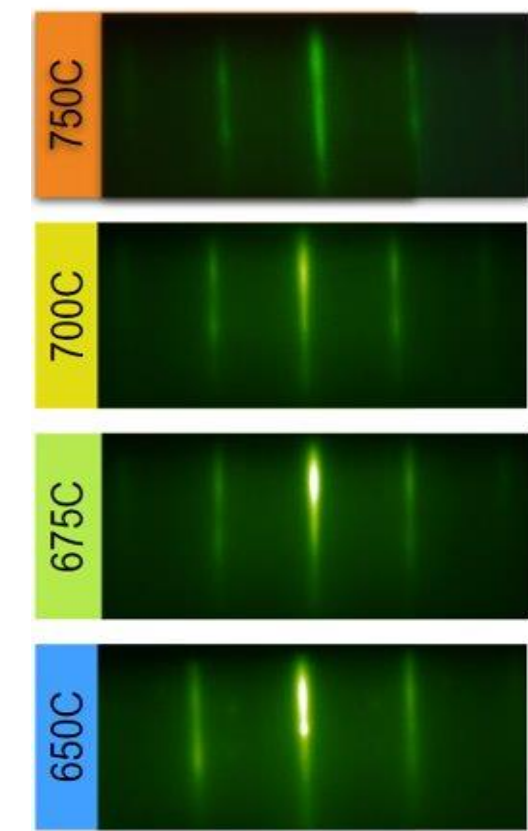
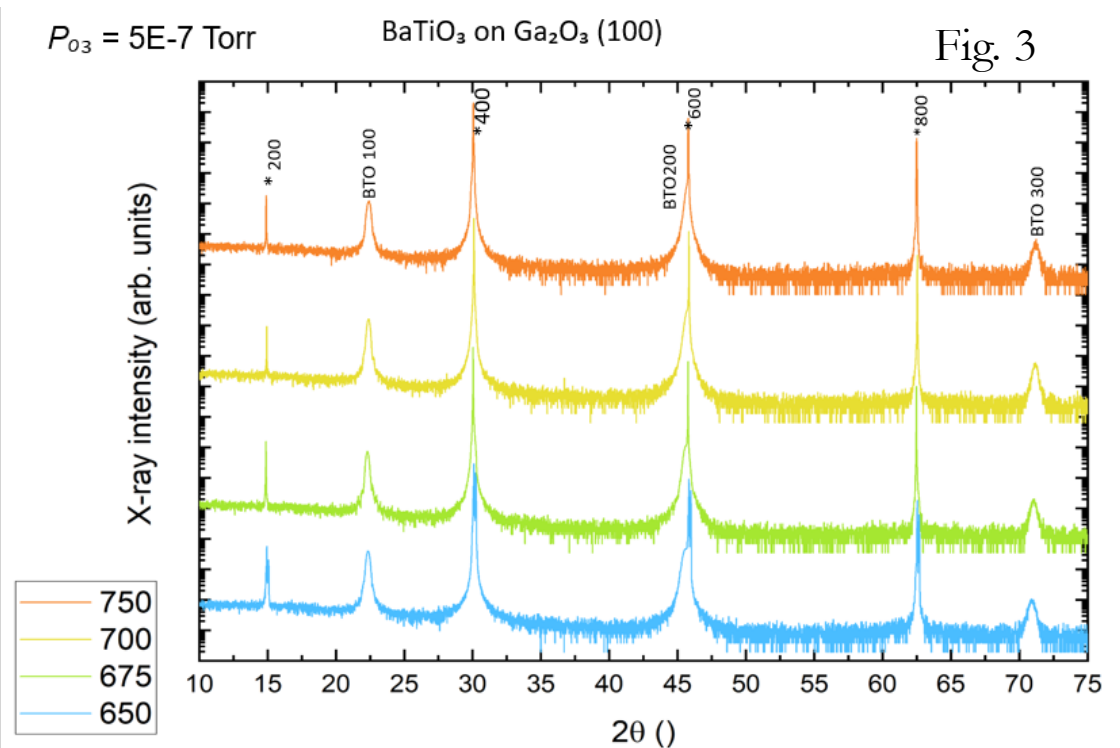


Fig. 5

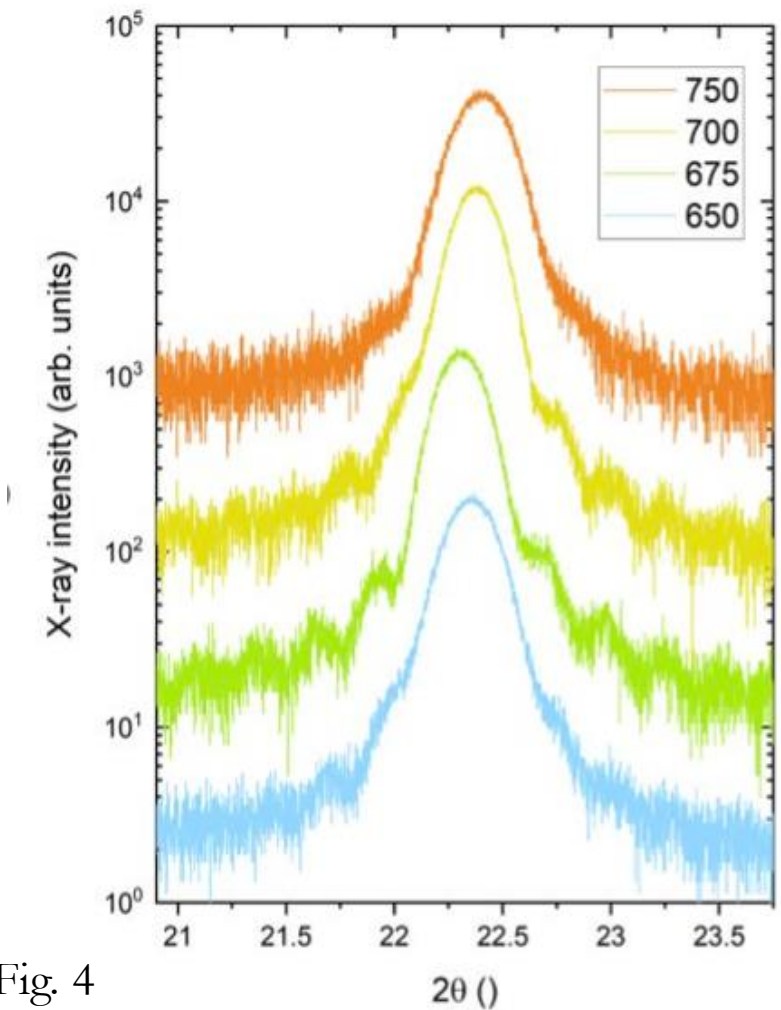


Fig. 4

- With XRD we confirmed we grew : Epitaxial BaTiO₃ grown on β-Ga₂O₃ (shown in fig. 3&4)
- Fringes on the BTO peak in fig. 4 correspond to the RHEED pattern in fig. 5 and indicate crystallin quality

Conclusion & Feature work

- Grew epitaxial BaTiO₃ on β-Ga₂O₃ (100)
- Confirmed by RHEED and XRD
- Confirm quality with TEM measurements
- Grow device quality films : BaTiO₃ / β-Ga₂O₃ (100) and measure the breakdown electric field

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- Paradim
- PREM program

Reference

- [1]D.W, L.H, Y.L, X.F, C.L, H.X, J.M. *Characterization of single crystal β-Ga₂O₃ films grown on SrTiO₃ (100) substrates by MOCVD*
- [2] Z.X, H.C, W.M, C.W, A.L, J.M, N.K.K, A.A, S.R, F.Y, S.R. *Metal/BaTiO₃/β-Ga₂O₃ Dielectric Heterojunction Diode with 5.7 MV/cm Breakdown Field*