1. Introduction
Wide band gap semiconductor ZnO has Multifunctionality: Piezoelectricity [1], Ferromagnetism [2], Optoelectronics [3].

Our Goal: Spontaneous Polarization in ZnO

- ZnO has hexagonal structure
- ZnO is non-centrosymmetric
- Zinc has 2 valence state in ZnO

Recent work
- Yang et al. [8,9] has reported a switchable spontaneous polarization

2. Experimental Details

- Dual-Laser PLD with ICCD Imaging System
- Laser Target Interaction

3. Thin Film Growth

Plume propagation by single laser 2 J/cm² UV excimer fluence at 1200 ns step

Plume profile vs. film quality

Our Plan
- Grow 2 at. % V-doped ZnO thin film at higher O₂ pressure
- Enhance O₂ Intensity for better Oxygen incorporation in the film

4. Resistivity measurements

Van der Pauw method was used
- The higher the O₂ pressure, more insulating were the films

Table 1: Resistivity and Hall measurement using Vander Pauw Technique

5. Electric Polarization

- Ferroelectric switching obtained in ZnO by doping it V³⁺ ion.
- Higher saturation polarization for films grown at high O₂ pressure
- ICCD imaging of the plume expansion
- Narrower for high O₂ pressure
- Ablated plume with broader expansion and higher intensity yielded smoother films
- Dual laser (UV+CO₂) will be used to grow films with reduced roughness

6. Conclusion

- Ferroelectric switching obtained in ZnO by doping it V³⁺ ion.
- Higher saturation polarization for films grown at high O₂ pressure
- Narrower for high O₂ pressure
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- Dual laser (UV+CO₂) will be used to grow films with reduced roughness

7. References

- Tara Dhakal, Devajyoti Mukherjee, Robert Hyde, Hariharan Srikanth, Prithish Mukherjee and Sarath Witanachchi