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Group Members

Research Projects

- General description of current research projects:
  - Fabrication and characterization of ohmic and Schottky contacts to semiconductors
  - Electrical characterization of semiconductors
  - UV-photoresponse characterization of wide bandgap materials
  - Modification of semiconductor properties by particle irradiation
  - Defect characterization in semiconductors by deep level transient spectroscopy (DLTS and high resolution Laplace-DLTS)

- Currently we do research on the following materials:
  Si, Ge, GaAs, Ga(Al)N, ZnO, SiC, Cd(Zn)Te

- Computer modelling and calculations of defect structures in semiconductors.

Experimental and Modelling Facilities

- Thin Film Deposition
  - Resistive evaporation
  - Electron beam evaporation
  - DC & RF sputtering
  - Inductively coupled plasma etching

- Electrical characterization
  - Open furnace (Ar, O, N, etc. gasflow)
  - Vacuum furnace

- Modelling of defects
  - Ab initio modelling of defects in semiconductors (VASP software)

Funding

- National Research Foundation
- IFIRR
- CPRR
- CSUR
- Blue Skies
- Student bursaries
- Norway-South Africa Bilateral: ZnO
- Italy - South Africa: CdTe, AlGaN
- Germany - South Africa: ZnO,GaN, AlGaN, Ge
- TIA: CSIR, UP, NMMU: daylight blind UV sensors: GaAIN and ZnO

Recent Publications


Research Activities

Research activities of our group can be outlined as follows:

- Cleaning and processing of semiconductor materials
- Studies on different metals and processes for fabrication of ohmic and Schottky contacts to semiconductor materials such as Ge, Si, AlGaAs, GaN, AlGaN and ZnO
- Electrical characterization of Schottky and ohmic contacts
- Introduction of defects through irradiation with protons or α-particles using a van de Graaf accelerator or radioactive sources
- Electrical characterization of radiation and process induced defects in semiconductor materials
- UV photoresponse characterization of GaN photodetectors

Collaboration

- International collaboration
  - Prof. Tony Peaker, University of Manchester, UK (Laplace DLTS)
  - Late Prof. Leszek Dobczeweski, Poland, (Laplace DLTS)
  - Prof. Bengt Svensson, University of Oslo, Norway (DLTS and Hall measurements on ZnO, radiation hardnes of semiconductors)
  - Dr. Holger von Wenckstern, University of Leipzig, Germany (Laplace-DLTS of radiation induced defects in PLD grown ZnO)
  - Prof. Andre Vantomme, KUL, Leuven, Belgium (ion implantation of semiconductors)
  - Prof. Anna Cavallini, Italy, Cd(Zn)Te and AlGaN

- Local collaboration
  - CSIR, UP, NMMU: Daylight blind UV sensors
  - University of the Free state: XPS of semiconductors
  - Nelson Mandela Metropolitan University: DLTS of GaAs and ZnO
  - DETEK: inductively coupled plasma etching of semiconductors

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- TIA: CSIR, UP, NMMU: daylight blind UV sensors: GaAIN and ZnO

Current Focus

- Defect introduction in Ge during inductively coupled plasma etching and Schottky barrier diode fabrication processes
- Fabrication and characterization of ohmic and Schottky contacts to semiconductors
- Electrical characterization of semiconductors
- UV-photoresponse characterization of wide bandgap materials
- Modification of semiconductor properties by particle irradiation
- Defect characterization in semiconductors by deep level transient spectroscopy (DLTS and high resolution Laplace-DLTS)

Materials

- Si, Ge, GaAs, Ga(Al)N, ZnO, SiC, Cd(Zn)Te

Facilities

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  - Resistive evaporation
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