
VARUN THAKUR

Academic Qualification

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| 2008 – 2016 | Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore
Integrated Ph.D. (Materials Science) |
| 2005 – 2008 | Sri Venkateswara College, Delhi University, New Delhi
B.Sc. (H) Chemistry, CGPA 6.0 |

Work Experience

2020-2021: Kreitman Post-Doctoral fellow, Ben Gurion University of the Negev Beersheva, Israel

Responsibilities:

- Photolithography of Si and GaN thin films using in-house equipment
- Operation of home-made electron beam deposition apparatus
- Review of current literature and writing reports

2018-2020: Post-Doctoral Fellow, Indian Institute of Technology, Delhi

Responsibilities:

- Measurement of Gamma irradiation effects on Ga₂O₃ thin films and photodetectors
- Maintenance and running of ICP-RIE instrument at the clean room facility
- Analysis of data and writing reports and manuscript for peer reviewed publication
- Helping students with data analysis and materials measurements

2016-2018: SERB N-PDF, Indian Institute of Science, Bangaluru

Responsibilities:

- Fabrication and characterization of ZnO nanorods for application as a piezoelectric diaphragm
- Design and synthesis of GaN based MEMS monolithically integrated with HEMT devices
- Analysis of data and writing reports and manuscript for peer reviewed publication
- Writing research grants to external agencies for funding

Fabrication of GaN thin films using Plasma Assisted Molecular Beam Epitaxy and their characterization (PhD)

Grew GaN thin films on c-sapphire substrate using a Plasma Assisted Molecular Beam Epitaxy and characterized the films using various techniques such as FESEM, HRXRD, AF, XPS, PL, UV-Vis, Hall etc.

Development of a biochemical SERS sensor using GaN nanowalls as a substrate

- Silver nanoparticles were deposited on GaN nanowalls by physical vapor deposition and the resultant substrate was tested as a SERS sensor
- Both positive as well as negatively charged proteins were detected on the substrate
- Reproducibility and homogeneity was shown to be excellent

Hydrochemical growth of ZnO nanowires for application as a pressure sensor

- Growth and characterization of ZnO nanowires using a hydrochemical method
- Optimization of substrate quality to ascertain vertically oriented and densely packed nanowires
- Assisted in device design and fabrication of diaphragm using the nanowires as a substrate

Development of a high vacuum annealing chamber

- A high vacuum annealing chamber was developed to rid of chemical impurities frequently obtained during annealing of films
- Parts were sourced and design of the chamber, stage and electrical connections was done
- Annealing temperatures of upto 600°C were obtained at base pressures of 10^{-6} Torr

Experimental and Software skills

- Plasma Assisted Molecular Beam Epitaxy, FESEM, HRXRD, PL, UV-Vis absorption spectroscopy, CL, XPS, AFM
- Quantum Espresso based Density Functional Theory simulations, FDTD, Mathematica, FORTRAN

1. Monu Mishra, **Varun Thakur**, Pankaj Srivastava, Govind Gupta, Investigation of band offset at PEDOT:PSS/GaN interface, *Applied Physics A*, 127, 274 (2021)
2. Randhir Kumar, Sudhanshu Tiwari, **Varun Thakur**, Rudra Pratap, Growth of ultrafast, super dense ZnO nanorods using microwaves for piezoelectric MEMS applications, *Mater. Chem. Phys.*, 255, 123607 (2020)
3. Himadri Chakraborti, Swarup Deb, Rüdiger Schott, **Varun Thakur**, Abhijit Chatterjee, Santosh Yadav, Rajendra K. Saroj, Andreas Wieck, S. M. Shivaprasad, K. Das Gupta, Subhabrata Dhar, Coherent transmission of superconducting carriers through a ~ 2 μm polar semiconductor, *Supercond. Sci. Technol.*, 31, 085007 (2018)
4. Swarup Deb, Hari Bhasker, **Varun Thakur**, S. M. Shivaprasad and S. Dhar, Polarization induced two dimensional confinement of carriers in wedge shaped polar semiconductors, *Sci. Rep.*, 6, pp. 1-7 (2016)
5. **Varun Thakur**, Soumik Siddhanta, C. Narayana, S. M. Shivaprasad, Size and distribution control of surface plasmon enhanced photoluminescence and SERS signal in Ag-GaN hybrid systems, *RSC Adv.*, 5, pp. 106832-106837 (2015)
6. H. P. Bhasker, **Varun Thakur**, S. M. Shivaprasad, S. Dhar, Role of quantum confinement in giving rise to high electron mobility in GaN nanowall networks, *Solid State Communications*, 220, pp. 72-76 (2015)
7. H. P. Bhasker, **Varun Thakur**, S. M. Shivaprasad, S. Dhar, Quantum coherence of electrons in random networks of c-axis oriented wedge-shaped GaN nanowalls grown by molecular beam epitaxy, *J. Phys. D: Appl. Phys.* 48, pp. 255302+7 (2015)
8. **Varun Thakur**, Sanjay Kumar Nayak, K. K. Nagaraja, S. M. Shivaprasad, Improved structural quality of GaN nanowall network grown on pre-nitrided c-sapphire, *IEEE Explore* December, pp. 1-4 (2015)
9. **Varun Thakur**, Sanjay Kumar Nayak, K. K. Nagaraja, S. M. Shivaprasad, Surface modification induced photoluminescence enhancement of GaN nanowall network grown on c-sapphire, *Electronic Materials Letters* 11, pp. 398-403 (2015)
10. **Varun Thakur**, S.M. Shivaprasad, X-ray photoelectron spectroscopy analysis of bonding changes in GaN nanowall network, *Appl. Surf. Sci.*, 327, pp. 389-393 (2015)
11. H.P. Bhaskar, **Varun Thakur**, Manoj Kesaria, S. M. Shivaprasad and S. Dhar, Transport and optical properties of c-axis oriented wedge shaped GaN nanowall network grown by molecular beam epitaxy, *AIP Conf. Proc.* 1583, pp. 252-258 (2014)

12. **Varun Thakur**, Manoj Kesaria and S.M. Shivaprasad, Enhanced band edge luminescence in stress and defect free GaN nanowall network morphology, *Solid State Comm.*, 171, pp. 8-12 (2013)
13. **Varun Thakur**, Soumik Siddhanta, Chandrabhas Narayana and S.M. Shivaprasad, A universal metal-semiconductor hybrid nanostructured SERS substrate for biosensing, *ACS Applied Materials and Interfaces* 4, pp. 5807-5812 (2012)