CURRICULUM VITAE

Dr. Venkatadivakar Botcha
Former Research Fellow
Optoelectronic Center,
Shenzhen University, China
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EDUCATION

Ph. D. (Physics, Dec 2015)
Department of Physics, Thinfilm laboratory
Thesis advisor: Prof. S. S. Major (Department of Physics) and Prof. Raman S. Srinivasa (Metallurgical Engineering & Materials Science), IIT Bombay
Thesis title: *"Study of Graphene Oxide and Reduced Graphene Oxide Monolayer Sheets and Related Nanostructured Composites with CdS and Cu Prepared by Langmuir-Blodgett Route"*

M. Sc Physics. (Solid State Physics, June 2007, First division), Department of Physics, Andhra University, India

WORK EXPERIENCE

- **Research Fellow/ Staff (April 2019-Dec.2021):** Optoelectronic Center, Shenzhen University, China
- **Postdoctoral Research Fellow (March 2017-April 2019):** College of Materials Science and Engineering, Shenzhen University, China
- **Assistant Professor (June 2015-Dec.2016):** University of Petroleum and Energy Studies (UPES), Dehradun, Uttarakhand, India
- Lead and coordinated B.Tech, M.Sc and M.Tech projects in our Thin Film laboratory, Department of Physics, IIT Bombay, 2010-2014
- Teaching assistant, different graduate and post graduate level laboratory and analytical technique courses, Department of Physics, IIT Bombay, 2009-2013
- STM and Scanning Probe Microscopy including, AFM, EFM, MFM, C- AFM, LFM, Atomic resolution imaging and Electrochemical Fluid Cell – FIST (Physics) IRCC Central facility at IIT Bombay, 2010-2014
    - All kind of samples ranging from semiconducting thinfilms, semiconducting nanocrystals, bio-materials, polymers, CNTs, fibers and self-assembled monolayers etc characterized as a part of teaching assistantship at IIT Bombay, (more than 1000 samples)

- E-beam lithography, Photo-lithography, SEM, Sputter system, Thermal Oxidation, Spinners and Contact angle measurement system - Centre of Excellence in Nanoelectronics (CEN) at IIT Bombay, 2010-2014

ACHIEVEMENTS/ CREDENTIALS:

- Secured 41th AUCET (Physics-2005)
- Secured 210th All India Rank in GATE-2009 (Physics) with 96.1 percentile
- Awarded full conference grant from CSIR, MRSI-Mumbai Chapter and CICS (all bodies of Govt. of India), to present my partial research work at International conference of ICOMF-LB15 held at Jeju, South Korea.
- Member of organizing committee/Volunteer, International Conference on Emerging Electronics (ICEE) held at IIT Bombay in Dec 2012
- Member of organizing committee/Volunteer, DAE - Solid State Physics Symposium (DAE-SSPS) held at IIT Bombay in Dec 2012
- Nominated for best thesis award in DAE - Solid State Physics Symposium (DAE-SSPS) held at Amity University, Noida, UP in Dec 2015
- Member of organizing committee, Research Initiative for Students of Engineering (RISE) held at University of Petroleum and Energy Studies (UPES), Dehradun, Uttarakhand, India in 2016

RESEARCH INTERESTS:

- Growth/Preparation and electrical characterization of advanced 2D based semiconductor/TMDs films such as, Graphene, Graphene oxide, Reduced Graphene Oxide, MoS_2, $SnSe_2$, In_2Se_3 etc
- Growth of semiconductor nanocomposites on 2D materials and its morphological studies
- Fabrication of Nanoelectonic devices on 2D materials and its semiconductor nanocomposites
- Thermal Properties/Temperature dependent Raman Studies

RESEARCH SKILLS:

I have worked in experimental semiconductor thin film and device fabrication laboratories accumulating various skills required for growth, fabrication and characterizations of different semiconductor thin films along with service and maintenance of tools required in the processes.

- Expertise in growth/deposition of semiconductor thin films/nanostructures – Langmuir-Blodgett Technique, RF sputtering system, Chemical vapor deposition (CVD), Physical vapor deposition (PVD), and Thermal/e-beam evaporator
- Lithography: High resolution electron beam lithography (EBPG-5150, Laser writer, Pioneer Two-Raith), Photoresist Spin-Bake Hood, Automated Coat-Bake, Solvent Spin-Bake Hood, Mask Processor.
- Expertise in STM and Scanning Probe Microscope (SPM) (AFM, EFM, MFM, C-AFM, LFM, Atomic resolution imaging and Electrochemical Fluid Cell)

- Expertise in Different vacuum pumps including ultra-high Vacuum (UHV)(Ion pump, cryopump, Turbo molecular pump, Diffusion pump), Rotary and membrane pumps.
- Expertise in Design and Fabrication of semiconductor devices such as FETs, Sensors and photo detectors.
- Expertise in RCA cleaning and safety protocols for micro/nano fabrication
- Expertise in Scanning electron microscopy (SEM)
- Expertise in Thermal/Wet Oxidation
- Expertise in Reactive ion etching
- Expertise in UV-Vis and FT-IR spectrophotometer
- Expertise in Electrical Characterizations using Keithley instrument
- Expertise in Photoluminescence spectroscopy, Raman spectroscopy, Profilometer, Ellipsometer, Gibbs Contact angle measurement and Optical Microscope
- Expertise in analysis and characterization of nanostructures using HR-TEM, X-ray Photoelectron spectroscopy, Ultra-violet photo electron spectroscopy (UPS)

LIST OF PATENTS

1. **V. Divakar Botcha,** Gulbagh Singh, Pavan K. Narayanam, R. S. Srinivasa and S. S. Major, A Process for Transferring Graphene Oxide Monolayer Sheets on Substrates. Published in the ***Indian Patent No. 311986, Granted Date: 30 April 2019.***

LIST OF PUBLICATIONS

A. Papers published in refereed Journals: [Citations: 349, h-index: 9, i-10 index: 9]

1. X Liu, X Deng, X Li, HC Chiu, Y Chen, V Divakar Botcha, M Wang, W Yu, CH Lin, Impact of Al_2O_3 stress liner on two-dimensional SnS_2 nanosheet for photo detector application, J. Alloy. Comp. 830 154716, 2020. (IF: 5.316)
2. X Liu, S Hu, Y Hong, Z Li, J Luo, K Li, L Song, Y Zhang, U Younis and **V Divakar Botcha*** (*Corresponding author)**,** Growth of necklace-like In_2Se_3 nanowires using MoS_2 seed layer during PVD method, Journal of Crystal Growth 526, 125215, 2019. (IF: 1.797)
3. Pavan K. Narayanam, V **Divakar Botcha**, M Ghosh and S. S. Major, Growth and photocatalytic behavior of transparent reduced GO–ZnO nanocomposite sheets, Nanotechnology 30 (48), 485601, 2019. (IF: 3.874)
4. X Liu, K Li, X Sun, Z Shi, Z Huang, Z Li, L Min, **V Divakar Botcha**, X Chen, X Xu and D Li, Modified band alignment at multilayer MoS_2/Al_2O_3 heterojunctions by nitridation treatment, J. Alloy. Comp. 793, 599-603, 2019. (IF: 5.316)
5. X Liu, Z Li, L Min, Y Peng, X Xiong, Y Lu, JP Ao, J Fang, W He, K Li, J Wu, W Mao, U Younis and **V Divakar Botcha*,** Effect of stress layer on thermal properties of $SnSe_2$ few layers, J. Alloy. Comp. 783, 226-231, 2019. (IF: 5.316)
6. X Liu, Y Hong, Z Li, C Xu, W He, U Younis, Q Liu, J Wu, Y Lu, **V. Divakar Botcha***, Enhanced thermal conductivity of MoS_2/InSe-nanoparticles/MoS2 hybrid sandwich structure, J. Alloy. Comp. 777, 1145-1151, 2019. (IF: 5.316)

7. **V. Divakar Botcha**, Y Hong, Z Huang, Z Li, Q Liu, J Wu, Y Lu, X Liu Growth and thermal properties of various In_2Se_3 nanostructures prepared by single step PVD technique, J. Alloy. Comp. 773, 698-705, 2019. (IF: 5.316)
8. A Sourav, Z Li, Z Huang, **V. Divakar Botcha**, C Hu, JP Ao, Y Peng, HC Kuo, J Wu, X Liu, KW Ang, Large‐Scale Transparent Molybdenum Disulfide Plasmonic Photodetector Using Split Bull Eye Structure. Adv. Optical Mater. 6 (20), 1800461, 2018. (IF: 9.926)
9. PK Narayanam, P Soni, **V. Divakar Botcha**, G Singh, SS Major, Transparent and Hydrophobic "Reduced Graphene Oxide–Titanium Dioxide" Nanocomposites for Nonwetting Device Applications, ACS Applied Nano Materials 1 (10), 5691-5701, 2018. (IF: 3.939)
10. **V. Divakar Botcha**, DS Sutar, SS Major, Study of GO-Cu2O and RGO-Cu nanocomposite monolayer sheets prepared by modified Langmuir Blodgett route, Journal of Physics and Chemistry of Solids 118, 158-165, 2018. (IF: 3.995)
11. H Gu, L Chen, Y Lu, F Tian, Z Zhang, K Xu, J Wu, **V. Divakar Botcha**, K Li, X Liu, Low-temperature study of neutral and charged excitons in the large-area monolayer WS2, Japanese Journal of Applied Physics 57 (6), 060309, 2018. (IF: 1.376)
12. **V. Divakar Botcha**, M Zhang, K Li, H Gu, Z Huang, J Cai, Y Lu, W Yu, X Liu, High-K substrate effect on thermal properties of 2D InSe few layer, J. Alloy. Comp. 735, 594-599, 2018. (IF: 5.316)
13. **V. Divakar Botcha**, Gulbagh Singh, Pavan K. Narayanam, S. S. Talwar, R. S. Srinivasa and S. S. Major, A 'modified' Langmuir-Blodgett technique for the deposition of graphene oxide monolayer sheets, *Mater. Res. Express, 3 (2016) 035002*. (IF: 1.62)
14. Gulbagh Singh, **V. Divakar Botcha**, D. S. Sutar, S. S. Talwar, R. S. Srinivasa and S.S. Major, Graphite Mediated Reduction of Graphene Oxide Monolayer Sheets, *Carbon 95 (2015) 843*-851. (IF: 9.594)
15. **V. Divakar Botcha**, Pavan K. Narayanam, Gulbagh Singh, S. S. Talwar, R. S. Srinivasa and S. S. Major, Effect of Substrate and Subphase Conditions on the Surface Morphology of Graphene Oxide Sheets Prepared by Langmuir-Blodgett Technique, *Colloids and Surfaces A: Physicochemical and Engineering Aspects, 452 (2014) 65.* (IF: 4.539)
16. Gulbagh Singh , **V. Divakar Botcha**, D. S. Sutar, Pavan K. Narayanam, S. S. Talwar, R. S. Srinivasa and S.S. Major, Near room temperature reduction of graphene oxide Langmuir- Blodgett monolayers by hydrogen plasma, *Phys. Chem. Chem. Phys., 16 (2014) 11708.* (IF: 3.676)
17. Gulbagh Singh, D.S. Sutar, **V. Divakar Botcha**, Pavan K. Narayanam, S.S. Talwar, R.S. Srinivasa and S.S. Major, Study of simultaneous reduction and nitrogen doping of graphene oxide Langmuir–Blodgett monolayer sheets by ammonia plasma treatment, *Nanotechnology, 24 (2013) 355704*. (IF: 3.874)
18. D. S. Sutar, Gulbagh Singh, and **V. Divakar Botcha**, Electronic structure of graphene oxide and reduced graphene oxide monolayers, *Applied Physics Letters, 101 (2012) 103103*. (IF: 3.791)
19. Pavan K. Narayanam, Gulbagh Singh, **V. Divakar Botcha**, D. S. Sutar, S. S. Talwar, R. S. Srinivasa and S. S. Major, Growth of CdS nanocrystallites on graphene oxide Langmuir- Blodgett monolayers, *Nanotechnology, 23 (2012) 325605*. (IF: 3.874)

20. D. S. Sutar, Pavan K. Narayanam, Gulbagh Singh, **V. Divakar Botcha**, S. S. Talwar, R. S. Srinivasa and S. S. Major, Spectroscopic studies of large sheets of graphene oxide and reduced graphene oxide monolayers prepared by Langmuir-Blodgett technique, *Thin Solid Films, 520 (2012) 5991*. (IF: 2.183)

B. Papers published in conference proceedings:

21. **V .Divakar Botcha**, Gulbagh Singh, Pavan K. Narayanam, D. S. Sutar, S. S. Talwar, R. S. Srinivasa, S. S. Major, "GO and RGO Based FETs Fabricated With Langmuir-Blodgett Grown Monolayers", ***AIP Conf. Proc., 1447 (2012) 327.***
22. **V. Divakar Botcha,** Gulbagh Singh, Pavan K. Narayanam, D. S. Sutar, S. S. Talwar, R. S. Srinivasa, S. S. Major "Effect of Subphase pH on Langmuir-Blodgett Deposition of Graphene Oxide Monolayers on Si and SiO_2/Si Substrates", ***AIP Conf. Proc., 1512 (2013) 708.***
23. Gulbagh Singh, **V. Divakar Botcha**, Pavan K. Narayanam, D. S. Sutar, S. S. Talwar, R. S. Srinivasa, S. S. Major, "Reduction of Graphene oxide Monolayers Transferred on Si and Ti Substrates by LB Technique", ***AIP Conf. Proc., 1447 (2012) 389.***
24. Gulbagh Singh, **V. Divakar Botcha**, Pavan K. Narayanam, D. S. Sutar, S. S. Talwar, R. S. Srinivasa, S. S. Major, "Effect of Ammonia Plasma Treatment on Graphene Oxide LB Monolayers" ***AIP Conf. Proc., 1512 (2013) 702.***
25. R. Nandi, **V. Divakar Botcha**, Gulbagh Singh, Wasi Uddin, Devendra Singh, S. S. Talwar, R. S. Srinivasa, S. S. Major, "Graphene Oxide based Hybrid Nanostructures with ZnO Thin Films and Nanorods", ***AIP Conf. Proc., 1665 (2015) 080027.***

C. International/National Conference presentations:

26. **V. Divakar Botcha**, Gulbagh Singh, D.S. Sutar, Pavan K. Narayanam, S.S. Talwar, R .S. Srinivasa and S.S. Major, Graphene Oxide LB monolayers transferred on surface modified SiO_2 and Si substrates, **ICOMF-LB14, 2012, Paris, France** [**Oral**].
27. **V. Divakar Botcha**, Gulbagh Singh, D.S. Sutar, Pavan K. Narayanam, S.S. Talwar, R.S. Srinivasa and S.S. Major, Isotherm studies and optimization of LB deposition process of GO monolayers, **ICOMF-LB14, 2012**, **Paris, France** [**Poster**]**.**
28. **V. Divakar Botcha**, Gulbagh Singh, D.S. Sutar, S.S. Talwar, R. S. Srinivasa and S.S. Major, Electrostatic force microscopy of LB monolayers of reduced graphene oxide, **ICOMF-LB15, 2014**, **Jeju, Korea** [**Oral**].
29. **V. Divakar Botcha**, Gulbagh Singh, D. Singh, R. Nandi, Wasi Uddin, S.S. Talwar, R.S. Srinivasa and S.S. Major, Study of GO monolayers/sputtered ZnO hybrid layered structures, **ICOMF-LB15, 2014, Jeju, Korea** [**Poster**]**.**
30. **V. Divakar Botcha,** S.S. Talwar, R.S. Srinivasa and S.S. Major, Graphene oxide LB monolayers transferred on surface modified SiO_2 and Si substrates, Physics In-house Symposium (**SYMPHY), 2013**, **IIT Bombay, India** [**Oral**]**.**
31. **V. Divakar Botcha,** S.S. Talwar, R.S. Srinivasa and S.S. Major, Characterization of surface electrical properties of Reduction of graphene oxide LB monolayers using electrostatic force microscopy, Physics In-house Symposium (**SYMPHY), 2014**, **IIT Bombay, India** [**Oral**]**.**

32. **V. Divakar Botcha**, Gulbagh Singh, Wasi Uddin, S.S. Talwar, R.S. Srinivasa and S.S. Major, Reduction of graphene oxide LB sheets sandwiched between Arachidic Acid layers, **ECOF-14, 2015, Italy, Genova (Oral).**
33. **V. Divakar Botcha**, Wasi Uddin, Gulbagh Singh, S.S. Talwar, R.S. Srinivasa and S.S. Major, Fabrication of GO/CdS/GO Layered structures by Langmuir-Blodgett technique, **ECOF-14, 2015, Italy, Genova (Poster).**
34. Gulbagh Singh, **V. Divakar Botcha**, D.S. Sutar, Pavan K. Narayanam, S.S. Talwar, R.S. Srinivasa and S.S. Major, Reduction of graphene oxide LB monolayers deposited on Ti substrate, **ICOMF-LB14, 2012 Paris, France** [**Poster**].
35. Gulbagh Singh, **V. Divakar Botcha**, D.S. Sutar, Pavan K. Narayanam, S.S. Talwar, R.S. Srinivasa and S.S. Major, Reduction and nitrogen doping of graphene oxide LB monolayers by ammonia plasma treatment, **ICOMF-LB14 2012**, **Paris, France** [**Poster**].
36. Gulbagh Singh, **V. Divakar Botcha**, D.S. Sutar, Pavan K. Narayanam, S.S. Talwar, R.S. Srinivasa and S.S. Major, Hydrogenation of graphene oxide Langmuir-Blodgett monolayers by hydrogen plasma treatment, **ICOMF-LB15 2014, Jeju, Korea** [**Oral**].
37. Gulbagh Singh, **V. Divakar Botcha**, T. Sarkar, Pavan K. Narayanam, S.S. Talwar, R.S. Srinivasa and S.S. Major, Reduction of graphene oxide LB monolayers by Al over-layer, **ICOMF-LB15, 2014**, **Jeju, Korea** [**Poster**].
38. Gulbagh Singh, **V. Divakar Botcha**, S. S. Talwar, R. S. Srinivasa and S. S. Major, Reduction of graphene oxide LB monolayers by metal over-layers, **ECOF-14, 2015, Italy, Genova (Poster).**
39. **V. Divakar Botcha** and S.S. Major, Morphological studies of GO/ZnO thinfilms, **ICNPM-2015, Mahatma Gandhi University, Kerala, India (Poster).**
40. **V. Divakar Botcha** and S.S. Major, Study of Graphene Oxide and Reduced Graphene Oxide Monolayer Sheets and Related Nanostructured Composites with CdS and Cu Prepared by Langmuir-Blodgett Route, 60^{th} **DAE-SSPS, 2015, Amity University, Noida UP, India (Poster).**
41. **V. Divakar Botcha**, Y Hong, Z Li, Q Liu, J Wu, Y Lu, X Liu, Growth and thermal properties of Hybrid $MoS_2/In_2Se_3/MoS_2$ sandwich structures by single step PVD technique, **LDMO, 2018, Shenzhen, China (Oral).**

Professional membership:

1. Life member for "Materials Research Society of India" Indian academy of sciences, Mumbai (Membership Number: LMB3413)

Software and Computational skills:

- Clewin, Auto CAD, Raith 150-Two, Nano Scope, WSXM, LabView, Origin, X"pert highscore plus, Google Sketch Up, XnView, XPSPEAK4.1.
- Operating system: Windows, Ubuntu
- Languages/Packages: MS Office, Adobe Photoshop, Power point

Languages known:

English, Hindi, and Telugu