CURRICULUM VITAE

Dr. SAMBHAJI SUBHASH WARULE
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Educational Qualification

Doctor of Philosophy (Ph. D)

Thesis Title	:	Hierarchical Nanostructures of ZnO, Ag-ZnO, CeO_2-ZnO and Bi_2S_3: Structural, Optical and Field Electron Emission Investigations.
Year	:	January 2013
University	:	Department of Physics, University of Pune, Pune.

Master of Science in Physics

Grade	:	'**A**' (6.5 GPA out of 10)
Year	:	2007
University	:	Department of Physics, University of Pune, Pune.

Bachelor of Science in Physics

Grade	:	First Class with Distinction (78.58%)
Year	:	2004
College	:	R.B.N.B College, Shrirampur (University of Pune).

Postdoctoral research

1.12.2020- till date	:	SERB-TARE fellow (Mentor: Dr. Angshuman Nag, IISER, Pune)
Project	:	Design and fabrication of self-supported 2D materials based heterostructures for high current density field emitter and photodetector application.
9.04.2013- 04.01.2014	:	Research Associate (advisor Dr. S. B. Ogale, NCL, Pune)
Project	:	Topological defects in Non-collinear multiferrorics: A nanodomain approach to multifunctionality.

Teaching experience

06.01.2014 – Till Date	Assistant Professor in Physics Nowrosjee Wadia College, Pune.
14.08.2012 to 6.04.2013	Assistant Professor in Physics Chandmal Tarachand Bora College, Shirur, Pune.

Research Project

1. **Project title**: Design and fabrication of self-supported 2D materials based heterostructures for high current density field emitter and photodetector application
   Research grant: Science and Engineering Research Board for funding under Teachers Associateship for Research Excellence (TARE).
   Mentor: Dr. Angshuman Nag, Associate Professor, IISER, Pune.
   Duration: 3 yrs (1/12/2020 to 30/11/2023)
   Status: Ongoing

2. **Project title**: Design Inorganic Semiconductor-based Heterostructures for Enhance Field Emission behavior
   Research grant: B.C.U.D., S.P. Pune University, Pune
   Duration: 2 yrs (2016-2018)
   Status: Completed.

Publications

1. Hierarchical nanostructured ZnO with nanorods engendered to nanopencils and pin-cushion cactus with its field emission study
   S. S. Warule, N. S. Chaudhari, J. D. Ambekar, B. B. Kale and M. A. More, **ACS Appl. Mater. Interfaces**, **2011**, 3, 3454–3462.
2. Organization of cubic CeO_2 nanoparticles on the edges of self assembled tapered ZnO nanorods *via* a template free one-pot synthesis: significant Cathodoluminescence and field emission properties
   S. S. Warule, N. S. Chaudhari, B. B. Kale, K. R. Patil, P. M. Koinkar, M. A. More and R. Murakami, **Journal of Materials Chemistry**, **2012**, 22, 8887.
3. Architectured Bi_2S_3 nanoflowers: Photo-enhanced field emission study
   S. S. Warule, R. V. Kashid, D. R. Shinde, N. S. Chaudhari, B. B. Kale and M. A. More, **J. Nanoparticle Research**, **2012**, 14, 889.
4. Controlled synthesis aligned Bi_2S_3 nanowires, sharp apex nanowires and nanobelts with its morphology dependent field emission investigations
   S. S. Warule, N. S. Chaudhari, B. B. Kale, S. Pandiraj and M. A. More; **CrystEngComm, 2013**, 15, 890.
5. Single step hydrothermal approach for devising hierarchical Ag-ZnO heterostructures with significant enhancement in field emission performance
   S. S. Warule, N. S. Chaudhari, R. T. Khare, J. D. Ambekar, B. B. Kale and M. A. More;, **CrystEngComm**, **2013**, 15, 7475-7485.
6. Novel sonochemical assisted hydrothermal approach towards the controllable synthesis of ZnO nanorods, nanocups and nanoneedles and their photocatalytic study

S. S. Warule, N. S. Chaudhari, B. B. Kale and M. A. More; **CrystEngComm**, **2009**, 11, 2776–2783.

7. Ecofriendly hydrogen production from abundant hydrogen sulfide using solar light-driven hierarchical nanostructured $ZnIn_2S_4$ photocatalyst

   N. S. Chaudhari, A. P. Bhirud, R. S. Sonawane, L. K. Nikam, **S. S. Warule**, V. H. Rane and B. B. Kale; **Green Chemistry**, **2011**, 13, 2500-2506.

8. Maghemite (hematite) core (shell) Fe_2O_3 nanorods *via* thermolysis of a molecular solid of Fe-complex

   N. S. Chaudhari, **S. S. Warule**, S. Muduli, B. B. Kale, S. Jouen, B. Lefez, B. Hannoyer and S. B. Ogale; **Dalton Transactions**, **2011**, 40, 8003-8011.

9. From small aromatic molecules to functional nanostructured carbon by pulsed laser-induced photochemical stitching

   R. R. Gokhale, V. P. Thakare, **S. S. Warule**, B. Lefez, B. Hannoyer, J. P. Jog and S. B. Ogale; **AIP Advances**, **2012**, 2, 022130.

10. Carbon nanoscrolls by pyrolysis of a polymer

    P. Yadav, **S. Warule**, J. Joag and S. Ogale; **Solid State Comm.**, **2012**, 152, 2092-2095.

11. Quantum dot CdS coupled Cd_2SnO_4 photoanode with high photoelectrochemical water splitting efficiency

    S. Phadke, C. Ballal, A. Vaidya, **S. S. Warule** and S. B. Ogale, **J. Materials Chemistry A**, **2013**, 1, 12426.

12. Nanostructured N-doped TiO_2 marigold flowers for an efficient solar hydrogen production from H_2S

    N. S. Chaudhari, **S. S. Warule**, S. A. Dhanmane, M. V. Kulkarni, M. Valant and B. B. Kale; **Nanoscale**, **2013**, 5, 9383.

13. A hollow nanogold/meso-magnetite composite: Pulsed laser synthesis, properties and biosensing application

    N. S. Chaudhari, **S. S. Warule**, V. Thakare, S. Jouen, B. Hannoyer, B. B. Kale and S. B. Ogale; **J. Nanoparticle Research**, **2013**, 15, 2081.

14. Self assembled $ZnIn_2S_4$ rose and hollow marigold flower like nanostructures for solar hydrogen production

    N. S. Chaudhari, **S. S. Warule** and B. B. Kale; **RSC Advances**, **2014**, 24, 12182-12187.

15. Vapor-Liquid-Solid growth of one-dimensional tin sulfide (SnS) nanostructures with promising field emission behavior

S. R. Suryawanshi, **S. S. Warule**, S. S. Patil, K. R. Patil and M. A. More; **ACS Appl. Mater. Interfaces**, **2014**, 17, 140-148.

16. Quantum dots conjugated zinc oxide nanosheets: Impeder of microbial growth and biofilm
    R. Patil, H Gholap, **S. Warule**, A. Banpurkar, G. Kulkarni and W. Gade; **App. Surf. Sci.**, **2014,** 326, 73-81.
17. Photo-enhanced field emission characteristics of SnS_2 nanosheets
    S. R. Suryawanshi, **S. S. Warule**, N. S. Chaudhari, S. B. Ogale and M. A. More; **AIP Solid State Physics: Conf. Proc., 2014**, 1591, 342-344.
18. Decoration of CdS nanoparticles on 3D self-assembled ZnO nanorods: a single-step **process** with enhanced field emission behavior
    S. S. Warule,* N. S. Chaudhari, R.T. Shisode, K. V. Desa, B. B. Kale and M. A. More; **CrystEngComm, 2015**, 17, 140-148.
19. The Fowler-Nordheim behavior and mechanism of photo-sensitive field from SnS_2 nanosheets
    S. R. Suryawanshi, N. S. Chaudhari, **S. S. Warule** and M. A. More; **AIP Conf. Proc. 2015**, 1665, 050177.
20. Dramatic enhancement in photoresponse of β-In_2S_3 through suppression of dark conductivity by synthetic control of defect induced carrier compensation
    N. Chaudhari, L. Mandal, O. Game, **S. Warule**, D. Phase, S. Jadkar and S. Ogale; **ACS Appl. Mater. Interfaces, 2015,** 7, 17671–176812015.
21. Hierarchical Nanostructures of Au@ZnO: Antibacterial and Antibiofilm Agent
    R. Patil, **S. Warule**, G. Kulkarni, A. Banpurkar and H. Gholap; **Appl. Microbio. Biotechno., 2016**, 20, 5849-5858.
22. Field emission behaviour of manganese oxide nanorods synthesized by hydrothermal method
    P. K. Bankar, D. S. Gavhane, P. S. Kolhe, **S. S. Warule** and M. A. More; **AIP Conf. Proc. 2016**, 1731, 120030.
23. Nanostructured BiOI-GO composite: Facile room temperature synthesis with Enhanced multifunctionality as Field emission and Photocatalytic activity
    P. K. Bankar, **S. S. Warule**, S. R. Jadkar, N. S. Chaudhari and M. A. More; **RSC Advances, 2016**, 86, 83084.

24. Spatially branched CdS-Bi_2S_3 heteroarchitecture: Single step hydrothermal synthesis approach with Enhanced field emission performance and highly responsive broadband photodetection

    P. K. Bankar, M. Pawar, A. Pavbake, **S. S. Warule**, D. J. Late and M. A. More; **RSC Advances, 2016**, 97, 95092-95100.

Seminars / Conferences (selected)

International conferences: **11** National conferences/workshops: **6**

1. Poster selected for **free participation** in "ICONSAT-2012" held at Hyderabad during 20-23rd Jan. 2012.

Experimental Skills

- **Hands on experience with Field Emission Scanning Electron Microscopy (FESEM)**
  Four years experience on Hitachi S-4800 and FEI Nova SEM with operating skill of SE, EDAX, TED, STEM, GIS, and CL detector.
- **Hands on experience with Ultra High Vacuum Techniques**
- **Skilled with using Field Emission Microscope**
  Studied field emission characteristics of various nanostructures/heterostructures in parallel plate geometry. Furthermore, the field emission investigation from single emitter as well multi-emitters on W-microtip.
- **Handling skilled with various synthesis techniques**
  Chemical methods- Sonochemical, microwave, hydrothermal etc.
  Physical methods- Thermal evaporation
- **Having practical knowledge of different characterization techniques**

  SEM, TEM, EDAX (EDS), XRD, XPS, UV, PL, CL etc.

Teaching courses

Subject taught: Experimental Methods in Physics [M.Sc.];
Classical Electrodynamics [T.Y.B.Sc];
Mathematical Methods in Physics, Wave, Sound & Oscillations (S.Y.B.Sc.);
Mechanics and Heat & Thermodynamics (F.Y.B.Sc.).

Awards / Prizes

1. Award of "**DST SERB-TARE Fellowship**" (2020) at Indian Institute of Science and Research, Pune (INDIA).
2. Award of "**CSIR-Nehru Postdoctoral Fellowship**" (2014) at National Chemical Laboratory, Pune (INDIA).
3. Award of "**CSIR-Research Associate Fellowship**" (2014) at National Chemical Laboratory, Pune (INDIA).
4. Recipient of Late "**Dr. Ravikumar Bhalla**" award to be given to the Best Research Student of Department of Physics, University of Pune, (2011).
5. "**Best Thesis Presentation**" award in Raman Memorial Conference 2012, held at Department of Physics, University of Pune, on 2-3rd March 2012.

References

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Personal Details

Name : Sambhaji S. Warule

Date of Birth : 13/12/1983 **Gender** : Male

Marital status : Married **Nationality** : Indian

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- **Hobbies** : (1) To do effective teaching as well as research
  (2) Learning and handling of new experimental technique.