

Detailed CV



Name: Prof. Gopalakrishna Naik K

Educational Qualification: MSc (Mangalore University)

PhD (Indian Institute of Science, Bangalore)

Designation: Professor

Address for Correspondence: Department of Physics

Mangalore University

Mangalagangothri – 574199

DK District, Karnataka State, India

E-mail: gopal_mng@yahoo.com

Phone: 9945301454

Research Areas: Experimental semiconductor Physics, Thermoelectric materials,
and multiferroic materials

Professional Teaching Experience Condensed Matter Physics for over 25 years

Research Guidance (M.Phil. /Ph.D.):

Completed students' list

1. Dr. Shashidhar Bhat
2. Dr. Parameswari P M
3. Dr. Shrisha B V

Ongoing Registered Students' list

1. Mr. Sathisa D
2. Mr. Prasannakumar R

3. Mr. Abhishek N S
4. Yashaswini M
5. Hari Ganesha Y
6. Reshma R P
7. Swathi K S

Research Projects

Completed : 03

Sl. No.	Title of the Project	Funding Agency	Year	Amount
1	Studies on high temperature electron irradiated p-n junction and MOS devices	BRNS	2008-2011	Rs.14,79,244
2	Vapour phase transport growth and characterization of ZnO nanomaterials	UGC	2011-2014	Rs. 9,08,082
3	Study of optical and electrical properties of ZnO based thin films and nanomaterials	DST-SERB	2013-2015	Rs. 4,90,000

Research Journal Publications

International

1. Solvothermal synthesis of ZnO/CdS nanocomposite and its structural and optical properties. M Yashaswini, K Gopalakrishna Naik
AIP Conference Proceedings, **2142**, 140022 (2019); <https://doi.org/10.1063/1.5122535>
2. Synthesis of cobalt doped BiFeO₃ multiferroic thin films on p-Si substrate by sol-gel method. R Prasannakumara, BV Shrisha, K. Gopalakrishna Naik
AIP Conference Proceedings **1953**, 030247 (2018); <https://doi.org/10.1063/1.5032582>.
3. Synthesis and characterization of cobalt doped nickel oxide thin films by spray pyrolysis method. D Sathisha, K. Gopalakrishna Naik
AIP Conference Proceedings **1953**, 100021 (2018); <https://doi.org/10.1063/1.5032957>.
4. Influence of gamma ray irradiation on stoichiometry of hydrothermally synthesized bismuth telluride nanoparticles. NS Abishek, K. Gopalakrishna Naik,
AIP Conference Proceedings **1953**, 030067 (2018); <https://doi.org/10.1063/1.5032402>.
5. Structural and optical properties of cobalt doped multiferroics BiFeO₃ nanostructure thin films. R. Prasannakumara, K. Gopalakrishna Naik
AIP Conference Proceedings **1953**, 030106 (2018); <https://doi.org/10.1063/1.5032441>
6. Synthesis and characterization of Nickel oxide nanostructures by hydrothermal method.

- D. Sathisha, K. Gopalakrishna Naik
Advanced Science Letters, **24**, 5691-5694 (2018); <https://doi.org/10.1166/asl.2018.12178>
7. Deposition of undoped and Al doped ZnO thin films using RF magnetron sputtering and study of their structural, optical and electrical properties.
M Parvathy Venu, V Shrisha B, KM Balakrishna, K. Gopalakrishna Naik
AIP Conference Proceedings **1832**, 080041 (2017); <https://doi.org/10.1063/1.4980501>
 8. Hydrothermal growth and characterization of Al- doped ZnO nanorods.
BV Shrisha, S Bhat, D Kushavah, K. Gopalakrishna Naik
Materials Today: Proceedings, **3**, 1693-1701 (2016);
<https://doi.org/10.1016/j.matpr.2016.04.061>.
 9. Electrical behavior of CdS/Al Schottky barrier diode at low temperatures.
PM Parameshwari, B V Shrisha, PS Bhat, K. Gopalakrishna Naik.
Materials Today: Proceedings, **3**, 1620-1626 (2016);
<https://doi.org/10.1016/j.matpr.2016.04.051>,
 10. Hydrothermal Growth of ZnO Nanostructures on Seed Layer Coated Substrates and their Characterization.
Shrisha B. V., Shashidhara Bhat., Parvathy Venu M., K Gopalakrishna Naik.
IOSR Journal of Applied Physics (IOSR-JAP), **8**, 110-113 (2016).
 11. Studies on n-ZnO/p-Si heterojunction fabricated by hydrothermal method.
BV Shrisha, S Bhat, K. Gopalakrishna Naik
AIP Conference Proceedings, **1665**, 050147 (2015)
<https://doi.org/10.1063/1.4917788>,
 12. Temperature dependent electrical properties of Al/Cd_{0.8}Zn_{0.2}S/ITO Schottky diode.
Parameshwari P. M, Shrisha B. V, and K Gopalakrishna Naik.
AIP Conference Proceedings **1665**, 120009 (2015); <https://doi.org/10.1063/1.4918116>
 13. Au catalyst assisted growth of ZnO nanowires by vapour phase transport method on p-Si and fabrication of p-Si/n-ZnO heterojunction diode.
Shashidhara Bhat, K. Gopalakrishna Naik,
AIP Conference Proceedings **1665**, 050173 (2015); <https://doi.org/10.1063/1.4917814>
 14. Vapour phase transport growth and characterization of ZnO nanowires.
B. V. Shrisha, Shashidhar Bhat and K. Gopalakrishna Naik ,
AIP Conference Proceedings **1591**, 484 (2014); <https://doi.org/10.1063/1.4872647>
 15. Spray pyrolysis growth and characterization of Cd_{1-x}Zn_xS thin films.
P. M Parameshwari and K. Gopalakrishna Naik
Journal of Optoelectronic and Advance Materials **16**, 1361 (2014).
 16. The effect of electron irradiation on BJTs and MOSFETS at elevated temperatures.
K Gopalakrishna Naik, Shashidhara Bhat and Ganesh Sangeev
Scholars Research Library, Archives of Physics Research, **4**, 74 (2013).
 17. Synthesis of ZnO nanostructures by solvothermal method.
Shashidhara Bhat, Shrisha B. V. and K. Gopalakrishna Naik
Scholars Research Library, Archives of Physics 'Research, **4**, 61 (2013).
 18. Hydrothermal Growth and Characterization of ZnO Nanomaterials
Shashidhara Bhat, Shrisha B V, and K Gopalakrishna Naik
Physics of Semiconductor Devices pp 607-610 (2013);
https://doi.org/10.1007/978-3-319-03002-9_154

19. Effect of Cd/S molar ratio on the optical and electrical properties of spray deposited CdS thin films.
Parameshwari P M and K Gopalakrishna Naik
Physics of Semiconductor Devices pp 347-349, DOI https://doi.org/10.1007/978-3-319-03002-9_87
20. 8 MeV electron irradiation effects on light emitting diodes.
Shashidhara Bhat, K Gopalakrishna Naik and Ganesh Sangeev
Scholars Research Library, Archives of Physics Research, **4**, 39 (2012).
21. Structural, electrical and optical studies on spray deposited Cadmium Sulphide and Copper Indium Disulphide thin films.
Parameshwari P M, Shashidhara Bhat and K Gopalakrishna Naik
Scholars Research Library Archives of Physics 'Research, **3**, 441 (2012).
22. Fermi-edge singularity in photoluminescence spectra of modulation-doped AlGaAs/InGaAs/GaAs quantum wells.
K. Gopalakrishna Naik, K.S.R.K. Rao. T. Srinivasan and R. Muralidharan
Bull. Mater. Sci., **34**, 1645 (2011).
<https://doi.org/10.1007/s12034-011-0371-2>
23. Effect of confinement of gluons on ground state heavy meson spectrum in the relativistic harmonic model.
K.B. Vijayakumar and K. Gopalakrishna Naik
Canadian Journal of pure & applied Sciences, **4**, 1101 (2010).
24. Electroluminescence from modulation-doped pseudomorphic AlGaAs/InGaAs/GaAs quantum wells.
K. Gopalakrishna Naik and K.S.R.K. Rao
Physica B, **404**, 210 (2009). <https://doi.org/10.1016/j.physb.2008.10.026>
25. Anomalous Temperature dependence of Fermi-edge singularity in modulation doped AlGaAs/InGaAs/GaAs hetero-structures.
K. Gopalakrishna Naik, K.S.R.K. Rao , T. Srinivasan , R. Muralidharan and S. K. Mehta.
Mater. Res. Soc. Symp. Proc. **872** (2005) J18.18.1 - J18.18.6.
DOI: <https://doi.org/10.1557/PROC-872-J18.18>
26. Photoluminescence study of biexciton luminescence on the naturally occurring quantum dots in undoped InGaAs/GaAs quantum wells.
K. Gopalakrishna Naik K.S.R.K. Rao, T. Srinivasan, R. Muralidharan and S. K. Mehta
Physica B **353**, 205 (2004). <https://doi.org/10.1016/j.physb.2004.09.095>
27. Effect of hydrogen on modulation-doped AlGaAs/InGaAs/GaAs heterostructures: a photoluminescence study.
K. Gopalakrishna Naik K.S.R.K. Rao, T. Srinivasan, R. Muralidharan and S. K. Mehta
Solid State Commun. **132**, 805 (2004). <https://doi.org/10.1016/j.ssc.2004.09.051>
28. Temperature and excitation power dependence of bi-excitonic luminescence in InGaAs/GaAs multiple quantum wells.
Gopalakrishna Naik K, Rao K. S. R. K ; Murthy L. C. S ; Srinivasan T, T ; Murlaidharan, R, Mehta S K, Jain R K, Kumar Vikram.
Proceedings of SPIE - The International Society for Optical Engineering, 4746 (2002) 376-378.

29. The influence of temperature gradient and lowering speed of $\text{Ga}_x\text{In}_{1-x}\text{Sb}$ alloy crystals grown by vertical Bridgman Technique.
N. K. Udayashankar, K. Gopalakrishna Naik and H.L. Bhat
J. of Crystal Growth, **203**, 333 (1999).
[https://doi.org/10.1016/S0022-0248\(99\)00109-8](https://doi.org/10.1016/S0022-0248(99)00109-8)
30. Surface morphology, electrical and optical properties of gallium antimonide layers grown by liquid phase epitaxy.
P.S.Dutta, K.S.R. Koteswara Rao, H.L. Bhat, K. Gopalakrishna Naik, and V. Kumar.
J. of Crystal Growth, **152**, 14 (1995). [https://doi.org/10.1016/0022-0248\(95\)00071-2](https://doi.org/10.1016/0022-0248(95)00071-2)

National

1. Mathematica-The art of computing.
K.B. Vijayakumar, K. Gopalakrishna Naik and K.M. Balakrishna
LE Lab Experiments, **10**, 171 (2010).

Papers / poster presentations in Conferences / Seminars / Symposia

International

1. Current-voltage –temperature (I-V-T) and Capacitance –voltage (C-V) characteristics of Ag/CdS Schottky barrier diode.
Parameshwari P M, Shrisha B V, Satyanarayana Bhat P, and K. Gopalakrishna Naik, IWPSD -2015, 18th International Workshop on Physics of Semiconductor devices (December 7-10, 2015) held at India Institute of Science, Bangalore -560012, India (abstract book page No. 158).
2. Sol-gel synthesis and characterization of pure and Mn doped BiFeO_3 thin films.
Prasannakumar R, Shrisha B, Shashidhara Bhat, and Gopalakrishna Naik K, IWPSD -2015, 18th International Workshop on Physics of Semiconductor devices (December 7-10, 2015) held at India Institute of Science, Bangalore -560012, India (abstract book page No. 195).
3. Temperature dependent electrical characterization of n-ZnO:Al/p-Si heterojunction fabricated by hydrothermal method.
Shrisha B V, Shashidhara Bhat, Parameshwari P M, Parvathy Venu M, Dushyant Kushavah, and K Gopalakrishna Naik, IWPSD -2015, 18th International Workshop on

Physics of Semiconductor devices (December 7-10, 2015) held at India Institute of Science, Bangalore -560012, India (abstract book page No. 253).

4. Electrical and optical properties of Li doped ZnO thin films deposited by sol gel-spin coat method.

Parvathy Venu M, Shrisha B V and K Gopalakrishna Naik, IWPSD -2015, 18th International Workshop on Physics of Semiconductor devices (December 7-10, 2015) held at India Institute of Science, Bangalore -560012, India (abstract book page No. 477).

5. Growth of undoped and Li doped NiO thin films by spray pyrolysis method.

Sathisha D and Gopalakrishna Naik K, IWPSD -2015, 18th International Workshop on Physics of Semiconductor devices (December 7-10, 2015) held at India Institute of Science, Bangalore -560012, India (abstract book page No. 477).

6. Growth and characterization of Mn doped Bismuth ferrite thin films by Sol-gel method.

Prasannakumar R, Shrisha B V, Shashidhara Bhat, Sathisa D, Parvathi Venu M, and Gopalakrishna Naik K, International conference on Nanoscience, nanotechnology & advance materials (NANOS-2015) (14-17 December, 2015) held at Gitam University, Visakhapatnam – 530045 (AP), India (abstract book page No. 50).

7. Hydrothermal growth and characterization of pure and Al doped ZnO nanoparticles.

Shrisha B V, Shashidhara Bhat, Parvathy Venu M, Dushyant Kushavah, and K Gopalakrishna Naik, International conference on Nanoscience, nanotechnology & advance materials (NANOS-2015) (14-17 December, 2015) held at Gitam University, Visakhapatnam – 530045 (AP), India (abstract book page No. 182).

8. Sputter deposition of ZnO thin films and characterization.

Parvathy Venu M, Shrisha B V and K Gopalakrishna Naik, International conference on Nanoscience, nanotechnology & advance materials (NANOS-2015) (14-17 December, 2015) held at Gitam University, Visakhapatnam – 530045 (AP), India (abstract book page No. 213).

9. Catalyst assisted vapor phase transport growth and characterization of ZnO nanowires.

Shrisha B V, Shashidhara Bhat, Parvathy Venu M, Dushyant Kushavah, K Gopalakrishna Naik

International Conference on Materials Science & Technology 2016, University of Delhi, Delhi, India.

10. Spray pyrolysis growth and characterization of Cobalt doped ZnO nanoparticle thin films.

Shashidhara Bhat, Shrishna B. V and K. Gopalakrishna Naik

Souvenir of 4h International Science Congress, Udaipur, India 8th-9th Dec. 2014, ISCA-ISC-Poster-14PhyS-07.

11. Solar neutrino puzzle

K. Gopalakrishna Naik and K. B. Vijayakumar

International intradisciplinary Conference on the Frontiers of Astronomy, IICFA-2009, December 28-30, 2009, FMKMC College, Madikeri-571201, India (abstract book page. 37)

12. Photoluminescence and Magneto transport studies on modulation doped AlGaAs/ InGaAs/ GaAs quantum well.

K. Gopalakrishna Naik, K. S. R. K. Rao and V. Prasad.

International Conference RETMAC-2010 from 14 February 2010 to 15 February 2010, National Institute of Technology Karnataka, Surathkal, India

13. Electroluminescence from modulation-doped AlGaAs/InGaAs/GaAs Heterostructures.

Seventh International Conference on Optoelectronics, Fiber Optics and Photonics, 9th December to 11th December 2004, Cochin University of science and technology, Cochin, Kerala, India

14. Observation of Fermi-edge singularity in photoluminescence spectra of modulation-doped AlGaAs/InGaAs/GaAs heterostructures

Twelfth International workshop on Physics of semiconductor devices

IWPSD -2003, Dec 2003, Indian Institute of Technology, Madras, India

15. The effect of Interface states and indium composition on the Photoluminescence Properties of Exciton complexes in InGaAs/GaAs pseudomorphic quantum well heterostructures.

International conference on Physics at surfaces and interfaces (PSI 2002) March 4-8, 2002, Institute of Physics, Bhubaneswar, India

16. Surface and Interface State Passivation by hydrogen and its effect on the luminescence properties of AlGaAs/GaAs quantum well heterostructures grown by MBE.

International conference on Physics at surfaces and interfaces (PSI 2002) March 4-8, 2002, Institute of Physics, Bhubaneswar, India

17. Photoluminescence investigations of pseudomorphic GaAs/InGaAs/GaAs and modulation doped AlGaAs/InGaAs/GaAs quantum wells grown by molecular beam epitaxy.

Sixth International conference on optoelectronics, fiber optics and photonics, Photonics 2002, Dec. 16-18, 2002, Tata Institute of fundamental research & Indian Institute of Technology, Bombay, Mumbai, India

National

1. Transition element Manganese doped multiferroic Bismuth Ferrite thin films
Prasannakumara R, Shrisha B V, Shashidhara Bhat, and Gopalakrishna Naik K.

National conference on Particle Accelerator in interdisciplinary Research (PAIR-2017)

April 11-13, 2017, Organized by Department of Studies in Physics, Mangalore

University 574199 (abstract book page No. 30).

2. Synthesis, surface morphology and optical properties of ZnO/CdS nanocomposite

Yashaswini M and K Gopalakrishna Naik

National conference n Particle Accelerator in interdisciplinary Research (PAIR-2017)
April 11-13, 2017, Organized by Department of Studies in Physics, Mangalore
University 574199 (abstract book page No. 26).

3. Spray pyrolysis deposition of undoped and cobalt doped nickel oxide thin films

D. Sathisha and K. Gopalakrishna Naik

National conference n Particle Accelerator in interdisciplinary Research (PAIR-2017)
April 11-13, 2017, Organized by Department of Studies in Physics, Mangalore
University 574199 (abstract book page No. 5).

4. Effect of Gamma ray irradiation on Bismuth Telluride nanoparticles synthesized by
Hydrothermal method

N. S. Abishek and K. Gopalakrishna Naik

National conference n Particle Accelerator in interdisciplinary Research (PAIR-2017)
April 11-13, 2017, Organized by Department of Studies in Physics, Mangalore
University 574199 (abstract book page No. 4).

5. Ar annealed cobalt doped BiFeO₃ nanostructure thin films.

Prasnnakumar R and K Gopalakrishna Naik

Conference on Emerging Materials (CEMAT 2016, 18-19 July, 2016, Indian Institute
of Science, Bangalore 560012 (abstract book page No. 36).

6. Hydrothermal synthesis and characterization of Bi₂Te₃ nanoparticles for
thermoelectric applications.

N S Abishek and K Gopalakrishna Naik.

Conference on Emerging Materials (CEMAT 2016, 18-19 July, 2016, Indian Institute
of Science, Bangalore 560012 (abstract book page No. 146).

7. Vapour phase transport growth of ZnO nanostructures.

Shashidhara Bhat, Shrisha B V, and K Gopalakrishna Naik,

National Level conference on “Emerging Trends in condensed Matter Physics”
(ETMP-2013) Sept. 2013, held at Govt. First Grade College, Bettampay, Puttur Tq.
D.K, Karnataka Abstract book page. No.18).

8. Growth and characterization of ZnO nanostructures by solvothermal method.

Shrisha B V, Shashidhara Bhat, and K Gopalakrishna Naik,
National Level conference on “Emerging Trends in condensed Matter Physics”
(ETMP-2013) Sept. 2013, held at Govt. First Grade College, Bettampay, Puttur Tq.
D. K, Karnataka Abstract book page. No.50).

9. Effect of substrate temperature on the properties of spray deposited Copper Indium Disulphide thin films.

Parameshwari P M and K Gopalakrishna Naik,
National Level conference on “Emerging Trends in condensed Matter Physics”
(ETMP-2013) Sept. 2013, held at Govt. First Grade College, Bettampay, Puttur Tq.
D. K, Karnataka Abstract book page. No.51).

10. Spray deposition and characterization of nanocrystalline $\text{Cd}_{1-x}\text{Zn}_x\text{S}$ thin films.

Parameshwari P M and K Gopalakrishna. Naik
2nd National Conference on Condensed Matter Physics and
Applications (CMPA 2013) December 2013, held Manipal Institute of
Technology, Manipal- 576104, India. (Abstract book page No. 31).

11. Synthesis and Characterization of ZnO Micro and Nanostructures by
Hydrothermal growth.

Shrisha B V, Shashidhara Bhat and K Gopalakrishna Naik
2nd National Conference on Condensed Matter Physics and
Applications (CMPA 2013) December 2013, held Manipal Institute of
Technology, Manipal- 576104, India. (Abstract book page No. 36).

12. Fabrication of vapour phase transport deposition system and the growth of ZnO based nanomaterials.

K. Gopalakrishna Naik and Shashidhara Bhat
National conference on Condensed Matter Physics and Applications
(CMPA-2012) December 27-28, 2012 (Abstract book Page No. 25)

13. Structural, electrical and optical studies on spray deposited cadmium
sulphide and copper indium disulphide thin films

Parameshwari P M and K Gopalakrishna. Naik

National conference on Condensed Matter Physics and Applications
(CMPA-2012) December 27-28, 2012, (Abstract book Page No. 24)

14. Growth and characterization of Al doped ZnO and Al-Ni co-doped ZnO thin films.

Shashidhara Bhat and K. Gopalakrishna Naik

National conference on Condensed Matter Physics and Applications
(CMPA-2012) December 27-28, 2012, (Abstract book Page No. 29)

15. Fabrication of vapour phase transport deposition system and the growth of ZnO based nanomaterials

K. Gopalakrishna Naik and Shashidhara Bhat

National conference on Condensed Matter Physics and Applications
(CMPA-2012) December 27-28, 2012 (Abstract book Page No. 25)

16. Structural, electrical and optical studies on spray deposited cadmium sulphide and copper indium disulphide thin films

Parameshwari P M and K Gopalakrishna. Naik

National conference on Condensed Matter Physics and Applications
(CMPA-2012) December 27-28, 2012, (Abstract book Page No. 24)

17. Growth and characterization of Al doped ZnO and Al-Ni co-doped ZnO thin films.

Shashidhara Bhat and K. Gopalakrishna Naik

National conference on Condensed Matter Physics and Applications
(CMPA-2012) December 27-28, 2012, (Abstract book Page No. 29)

18. Quark gluon plasma and the big band theory.

K. B. Vijayakumar and K. Gopalakrishna Naik

National conference on engineering of materials through energetic particles, (NCEMEP), April 8-10, 2010, Bahubali College of engineering, Shravanbelagola, India

19. Solar Neutrino Puzzle

K. B. Vijayakumar and K. Gopalakrishna Naik

National conference on engineering of materials through energetic particles (NCEMEP), April 8-10, 2010

Bahubali College of engineering, Shravanbelagola, India

20. Electron irradiation effects on the electrical and optical characteristics of light emitting diodes.

K. Gopalakrishna Naik, Shashidhara Bhat and Ganesh Sangeev.

National conference on engineering of materials through energetic particles (NCEMEP), April 8-10, 2010, Bahubali College of engineering, Shravanbelagola, India.

21. 8 MeV electron irradiation effect on the characteristics of some commercial light emitting.

Shashidhara Bhat, K. Gopalakrishna Naik and Ganesh Sanjeev.

Proceedings of the 54th DAE Solid State Physics Symposium, pp. 953, December 14-18, 2009, MS University of Baroda, Vadodara, India

Invited / plenary talks delivered (list) (if applicable): 01

1. Growth of ZnO nanostructures by vapour phase transport method (Invited Talk).

Shrisha B V and K Gopalakrishna Naik

International Conference on Smart Materials and Technology for Emerging Electronics IC –SMTEE-2016 held during 19th and 20th of February, 2016 at Sahyadri College of Engineering & Management, Mangaluru, India.

Impact of publications in terms of (Non-science faculty can leave out this item, if unable to fill up).

h-index	6
i10 index	4
Citation index	90

Information on research facilities

We are trying to fabricate simple cost-effective home-made research equipment to carry out our research work. In this connection we have fabricated a few simple cost-effective equipment. The equipment developed in our laboratory are listed below.

Vapor phase transport growth set ups for the growth of ZnO based nanomaterials.



Spray pyrolysis system



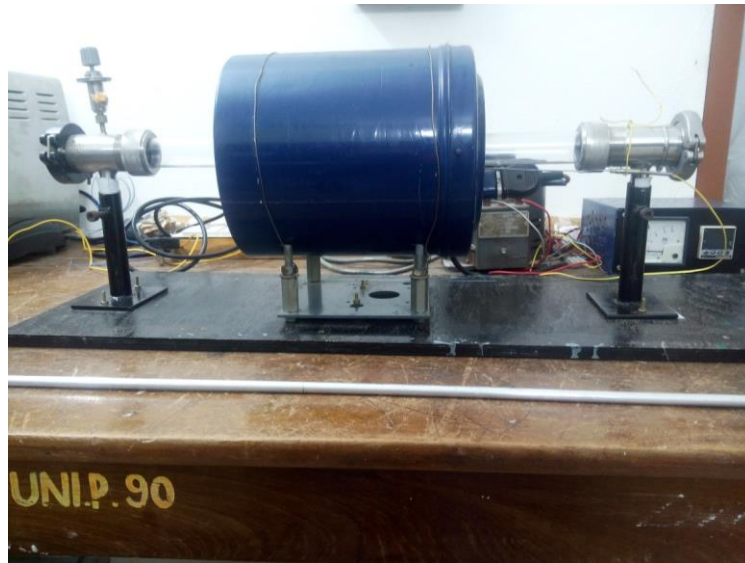
Tungsten-halogen lamp based rapid thermal annealing system



Tungsten-halogen lamp based close-spaced sublimation system



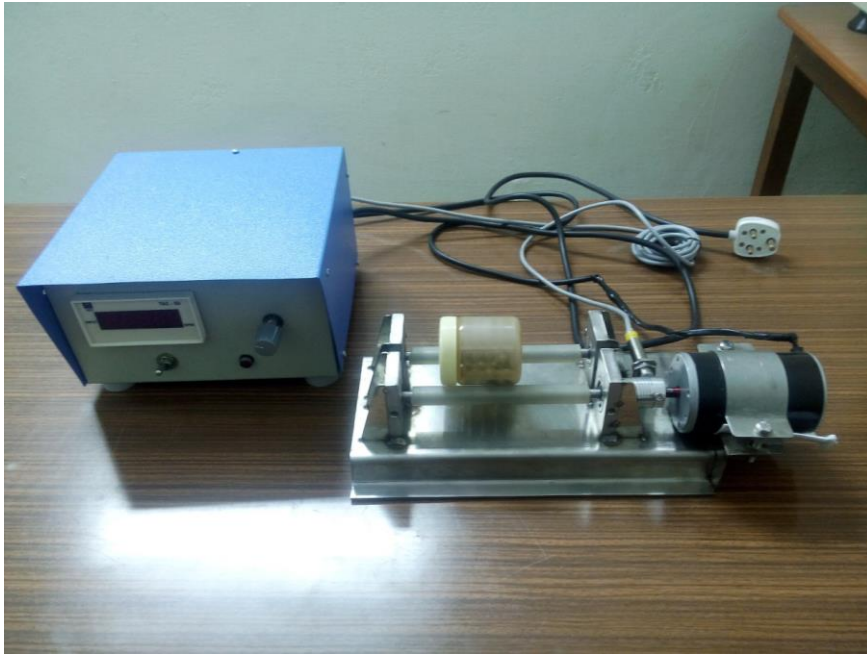
Furnace annealing systems under gas atmospheres as well as under vacuum.



Spinner / spin coater with vacuum chuck



Ball milling system



Gas sensor testing system



The equipment's available for research purpose in our laboratory

1. Resistive thermal evaporation systems.
2. DC magnetron sputtering system.
3. Diffusion pump based high vacuum pumping system.
4. Room temperature low-field Hall measurement system.
5. Keithley model 2400 Source meter.
6. Keithley model 2000 multimeter.
7. Agilent model 4263B LCR meter.
8. Keithley GPIB interface card.
9. Eurotherm PID temperature controller model 3504.
10. Shimadzu AUX 220 Electronic Analytical Balance.
11. Eutech pH 700 microprocessor-based Bench top pH Meter.
12. Alicat Scientific make Model NO. MC-500SCCM-D/5M, 5IN mass flow controllers.
13. Liquid Nitrogen Dewar's for low temperature electrical measurements.
14. Home-made arrangement for low temperature electrical measurement.
15. Home-made 3-inch diameter, 80 cm length horizontal Tubular Furnace with maximum temperature of about 1050 °C.
16. Home-made hydraulic press with 2-inch, 1 inch, and 12 mm die set for making sputter Targets and pellets