Dr. BASANTA BHOWMIK

Assistant Professor,
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Educational Qualification

Ph.D.	Electronics & Telecommunication Engg. Indian Institute of Engineering Science & Technology, Shibpur (An Institute of National Importance, Govt. of India)	Feb 2017 Howrah, Botanical Garden Kolkata, West Bengal-711103
M.Tech	VLSI Design Indian Institute of Information Technology, Gwalior (An Autonomous Institute of MHRD, Govt. of India)	June 2012 Morena link road, Gwalior Madhya Pradesh 474001
B.Tech	Electronics & Communication Engg. West Bengal University of Technology Kolkata	July 2009 Salt Lake City, Kolkata, West Bengal-700064

Professional Experience

Assistant Professor
NIT Jamshedpur , 8th June to Present

Assistant Professor
University College of Engineering & Technology, 3rd January to 7th June 2018
Vinoba Bhave University, Hazaribag
(Under TEQIP-III)

CSIR-Senior Research Fellow 1st Oct 2015-7th Feb 2017
Dept. of Electronics and Telecommunication Engg.
Indian Institute of Engineering Science & Tech, Shibpur
Howrah-711103

TEQIP-Senior Research Fellow 1st Jan 2014-31st July 2015
Dept. of Electronics and Telecommunication Engg.
Indian Institute of Engineering Science & Tech, Shibpur
Howrah-711103

Junior Research Fellow 1st Aug 2012-22th July 2013
Dept. of Electronics and Telecommunication Engg.
Indian Institute of Engineering Science & Tech, Shibpur
Howrah-711103

Research Experience

PhD Dissertation: Gas sensor devices based on nanostructures of TiO_2: Influence of dimensionality
Awarded best PhD Thesis-2017 (Second Place) by ISSS, IISc Bangalore
Supervisor: Dr. Partha Bhattacharyya
Dept. of Electronics and Telecommunication
Indian Institute of Engineering Science & Technology, Shibpur
Howrah-711103, West Bengal, India

Area of Research

- Modeling and Fabrication of Nanomaterial based Devices for sensing application
- Nanomaterials for Thermoelectric application
- Low power Analog VLSI

Area of Interest

- Nanoelectronics
- Nanomaterials for sensing and energy storage (thermoelectric) application
- Semiconductor device fabrication and characterization
- Analog Layout design techniques

Professional Skills

- **Design Tools** **:** Cadence, Synopsis, TANNER TOOLS v13.0, PSPICE, SILVACO (TCAD, ICCAD), MALLAB 2009a
- **Process Technology:** Clean room experience, Etching, Metallization, Masking Annealing,
- **Nanomaterial Synthesis** : Material synthesis (0D-3D nanostructures formation) Structural characterization (XRD, EDS), Morphological characterization (FESEM and AFM), Optical characterizations (XPS and PL Spectroscopy), Electrical characterization (ECV and Hall measurement) and gas sensing properties
- **Languages** **:** VHDL

Honors/Achievements/Recognition

- Awarded **best PhD thesis-2017** (Second Place) by Institute of Smart Structures and Systems, IISc Bangalore
- **Reviewer** of IEEE Sensor Journal
- **Best paper Award** for the paper "Development of highly efficient acetone sensing devicee based on titania thin film" authored by Basanta Bhowmik, Partha Bhattacharyya, Research Scholar Day-2014, Organized by Indian Institute of Engineering Science and Technology, shibpur, 29-30th January, 2014, India.
- **Grants to attended** the Nanotoday conference 2015, Dubai, UAE, supported by **DST India**

- **Grants to attended** the conference **IEEE Sensor 2014**, Valencia, Spain supported by COE-TEQIP-II, IIEST Shibpur, India
- **Senior Research Fellowship** (SRF) from Council of Scientific and Industrial Research (CSIR), India, 2014.
- **Senior research fellowship (SRF)** from COE-TEQIP-II, IIEST Shibpur, India 2013
- **Junior Research Fellowship (JRF)** from Council of Scientific and Industrial Research (CSIR), India, 2012
- **Faculty position** (Assistant Professor) offered by Dept. of Electronics & Communication Engineering, **National Institute of Technology, Sikkim on** February 2017
- Working as a **program committee member** in the organization committee of "National Symposium on Recent advances in Nanoscience, Engineering &Technology (RANET), Nov-19-20,2011.
- **Organizing Committee Member,** Research Scholar day celebration 29-30th January, 2014, Indian Institute of Engineering Science and Technology (IIEST), Shibpur, West Bengal, India.
- Member Committee for **Baltic Conference Series-2017**, Stockholm (Sweden), 08 October 2017
- Reviewer of The 8th International Conference on Electronics, Communications and Networks Nov. 16-19, 2018, Bangkok, Thailand

Scientific Collaboration

- **Dr. Partha Bhattacharyya** (PhD supervisor), Dept. of Electronics and Telecommunication Engineering, IIEST Shibpur, Botanical Garden, Howrah, India (Project: Gas sensor devices)
- **Dr. York R Smith**, Dept. of Metallurgical Engineering, University of Utah, Salt Lake City, Utah State, USA (Project: Noninvasive disease diagnosis)
- **Dr. Per Elkund** and **Dr. Biplab Paul,** Thin film Physics division, Linkoping University, Sweden (Project: Nanomaterials for thermoelectric application)
- **Dr. Arnab Hazra**, Dept. of Electronics and Communication, BITS Pilani Campus, India (Project: Sensor for Air Quality monitoring)
- **Dr. Sashikant Sharma**, Dept. of Electronics and Communication Engineering, Amity University, Jaipur, India (Project: Homojunction and heterojunction)

List of Publication

Book/Book Chapter/Monograph:

1. P. Bhattacharyya, **B. Bhowmik**, A. Hazra, P.P. Chattopadhyay, Potentiality of semiconducting metal oxide nanoforms as solid state vapor sensors, in the book 'Sensing Technology: Current Status and Future Trends IV', Edited by Alex Mason, Subhas Chandra Mukhopadhyay, P. Krishanthi Jayasundera, Springe**r**, UK (2015).

Peer Reviewed Archived Journals (SCI): (Total number=18)

1. **B. Bhowmik** and P. Bhattacharyya, Efficient Gas Sensor Devices based on Surface Engineered Oxygen Vacancy Controlled TiO_2 Nanosheets, ***IEEE Transactions on Electron Devices*** *(IEEE)*, vol. 64, pp. 2357-2363, May-2017, (Impact factor: 2.605**)**

2. **B. Bhowmik** and P. Bhattacharyya, A Proton Hopping Guided 3-D Space Charge Model for Quantitative Understanding of Humidity Dependent Gas Sensing by TiO_2 Nanoflower based Devices, ***IEEE Transactions on Nanotechnology***, vol. 16, no. 2, pp. 180-188, March-2017 (**Impact factor: 2.485)**

3. K. Dutta, **B. Bhowmik** and P. Bhattacharyya, Resonant Frequency Tuning Technique for Selective Detection of Alcohols by TiO_2 Nanorod based Capacitive Device, ***IEEE Transactions on Nanotechnology*** *(IEEE)*, vol. 16, no. 5, pp. 820-825, March-2017 (**Impact Factor: 2.485**),

4. **B. Bhowmik**, A. Hazra, K. Dutta, P. Bhattacharyya, Repeatability and Stability of Room Temperature Acetone Sensor based on TiO_2 Nanotubes: Influence of Stoichiometry Variation, ***IEEE Transactions on Device and Materials reliability*** *(IEEE*), vol. 14, no.1, pp. 961-967, 2014 (**Impact factor: 1.575).**

5. **B. Bhowmik,** H.-J. Fecht**,** P. Bhattacharyya**,** Vertical Mode Optimal Acetone Sensing Performance of TiO_2 Nanotube array by Tuning of Surface Area and Carrier Transport Time via Nanotube Length Variation, ***IEEE Sensor Journal*** *(IEEE)*, vol. 15, no.10, pp.5919-5926**, July-**2015 **(Impact factor 2.512)**.

6. **B. Bhowmik,** V. Manjuladevi, R. K. Gupta, P. Bhattacharyya, Highly Selective Low Temperature Acetone Sensor based on Hierarchical 3-D TiO_2 Nanoflowers, ***IEEE Sensor Journal*** *(IEEE)*, vol. 16, pp. 3488-3495, May-2016 **(Impact factor 2.512**).

7. **B. Bhowmik**, K. Dutta, A. Hazra, P. Bhattacharyya, Low Temperature Acetone Detection by p-type Nanocrystalline TiO_2 Thin Film: Equivalent Circuit Model and Sensing Mechanism, ***Solid State Electronics*** (Elsevier), vol. 99, pp. 84-92, 2014, (**Impact factor: 1.580**).

8. **B. Bhowmik** and P. Bhattacharyya, Highly Stable Low Temperature Alcohol Sensor Based on Hydrothermally Grown Tetragonal Titania Nanorods, ***RSC Advances*** *(RSC)*, vol. 5, pp. 82159-82168, Sep-2015 (**Impact factor 3.289**).

9. P. Bhattacharyya, **B. Bhowmik**, H. J. Fetch, Operating Temperature, Selectivity and Repeatability of TiO_2 Nanotube based Acetone Sensor: Influence of Pd and Ni nanoparticle Modifications, ***IEEE Transactions on Devices and Materials Reliability*** *(IEEE)*, vol 14. no. 1, pp. 187-195, July-2015 **(Impact factor: 1.575)**.

10. A. Hazra, K. Dutta, B. **Bhowmik**, P.P. Chattopadhyay, P. Bhattacharyya, Room Temperature Alcohol Sensing by Stoichiometry Controlled TiO_2 Nanotube Array,

Applied Physics Letter *(AIP),* vol. 105, pp. 081604-081607, Aug-2014, (**Impact Factor: 3.411)**.

11. A. Hazra, **B**. **Bhowmik**, K. Dutta, P.P. Chattopadhyay, P. Bhattacharyya, Stoichiometry, Length, and Wall Thickness Optimization of TiO_2 Nanotube Array for Efficient Alcohol Sensing, ***ACS Appl. Mater. Interfaces*** *(ACS)*, vol. 7, pp.9336−9348*,* 2015 **(Impact factor 7.504)**.

12. A. Hazra, **B. Bhowmik**, K. Dutta, V. Manjuladevi, R. K. Gupta, P. P. Chattopadhyay, P. Bhattacharyya, Formation Mechanism of Anodically Grown Free-Standing TiO_2 Nanotube Array under the Influence of Mixed Electrolytes, ***Science of Advance Material*** *(ASP)***,** vol. 6, pp. 714-719, April-2014 (**Impact factor: 2.598)**.

13. N. Banerjee, **B. Bhowmik**, S. Sarkar, C. K. Sarkar, P. Bhattacharyya, Anomalous Recovery Characteristics of Pd Modified ZnO Nanorod based Acetone Sensor, ***Journal of Nanoscience and Nanotechnology*** *(ASP)*, vol 13, pp.1-8, Oct-2013 (**Impact factor: 1.5)**.

14. K. Dutta, **B. Bhowmik**, A. Hazra, P. P. Chattopadhyay, P. Bhattacharyya, An efficient BTX Sensor Based on p-type Nanoporous Titania Thin Films, ***Microelectronics Reliability*** *(Elsevier),* vol. 55, pp. 558–564, Feb-2015 (**Impact Factor: 1.371)**.

15. A. Hazra, K. Dutta, **B**. **Bhowmik**, P. Bhattacharyya, Highly Repeatable Low-ppm Ethanol Sensing Characteristics of p-TiO_2-Based Resistive Devices, ***IEEE Sensors Journal*** *(IEEE)*, vol. 15, no. 1, pp.408-416, Jan-2015, **(Impact Factor 2.512)**.

16. A. Hazra, K. Dutta, **B. Bhowmik**, V. Manjuladevi, R. K. Gupta, P. Bhattacharyya, Low Temperature Methanol Sensing by p-titania: Correlation with Defects States and Schottky Barrier Model, ***IEEE Transactions on Nanotechnology*** *(IEEE)*, vol 14. no. 1, pp. 187-195, 2014, (**Impact Factor: 2.485)**.

17. A. Hazra, K. Dutta, **B. Bhowmik**, V. Manjuladevi, R. K. Gupta, P. P. Chattopadhyay, P. Bhattacharyya, Electrochemically Grown Connected and Free Standing TiO_2 Nanotube Array using Mixed Electrolyte: Structural and Optical Characterizations, ***Journal of Electronic Material*** *(Springer),* vol. 43 (9) pp. 3229-3235 , Sept-2014, (Impact factor: 1.491**)**.

18. S. K. Sharma, **B. Bhowmik**, V. Pal, C. Periasamy, Electrical and Methanol Sensing Characteristics of RF Sputtered n-ZnO/p-Si Heterojunction Diodes, ***IEEE Sensors Journal***, vol. 17 (22), pp. 7332-7339, 2017 **(Impact Factor 2.512)**.

Conference paper (Total number: 14)

1. **B. Bhowmik**, P.P. Chattopadhyay, H. J. Fecht and P. Bhattacharyya, 1D and 3D nanostructures of TiO_2 as gas sensing element: A Comparative study, 4th Nanotoday Conference, Dubai, 6-10th December 2015.

2. **B. Bhowmik**, K. Dutta and P. Bhattacharyya, n-TiO_2/p-Si Heterojunction Devices as a Potential Ethanol Sensor, Conference on Computers and Devices for Communication, Swiss hotel, Kolkata, 16-18th December 2015.

3. **B. Bhowmik** and P. Bhattacharyya, Development of Efficient Acetone Sensor based on 0-D, 1-D, 2-D and 3-D Nanostructures of TiO_2, Young Scientist Colloquium-2015, Organized by Materials Research Society of India (Kolkata chapter), CSIR-CGCRI Kolkata,11th Sept 2015.

4. **B. Bhowmik**, A. Hazra, K. Dutta, P. Bhattacharyya, Nanocrystalline p-TiO_2 based MIS Device for Efficient Acetone Detection, *IEEE SENSORS 2014*, vol., no., pp.293-296, Valencia, Spain, 2-5 Nov. 2014

5. **B. Bhowmik**, A. Hazra, K. Dutta, P. Bhattacharyya, Development of Pd/TiO_2/Si MIS Ethanol Sensor using Nano-TiO_2 Sensing Layer, *International Union of Material Research Society-International Conference in India 2013*, IISc Bangalore, India, 16-20th December, 2013.

6. **B. Bhowmik**, K. Dutta, N. Banerjee, A. Hazra, P. Bhattacharyya, Low Temperature Acetone Sensor Based on Sol-gel Grown Nano TiO_2Thin Film, *International Conference on Emerging Trends in Computing, Communication and Nanotechnology (ICE-CCN), 2013*, vol., no., pp.553,557, Tutikorin, Tamilnadu, 25-26th March 2013 doi: 10.1109/ICE-CCN.2013.6528561

7. S. Ghosal**, B. Bhowmik** and P. Bhattacharyya, Low temperature ethanol sensing performance of hydrothermally grown TiO_2 nanoflowers in resistive mode, 4th Nanotoday Conference, Dubai, 6-10th December 2015.

8. K. Dutta, **B. Bhowmik**, P. P. Chattopadhyay and P. Bhattacharyya, Titania Nanotube based Xylene Sensor; Influence of Anodization Voltage, Conference on Computers and Devices for Communication, Swiss hotel, Kolkata,16-18th 2015.

9. A. Hazra, **B. Bhowmik**, K. Dutta, P. Bhattacharyya, Low Temperature Low ppm Acetone Detection by Pd/TiO_2/p-Si Metal-Insulator-Semiconductor Devices, 7th International Conference on Sensing Technology (ICST 2013)Wellington, New Zealand 3-5th Dec 2013, pp-396-400

10. A. Hazra, **B. Bhowmik**, K. Dutta, P. Bhattacharyya, Sol-gel Derived Nanocrystalline Undoped p-TiO_2 Thin Film: Structural, Optical and MIS Device Characteristics, International Union of Material Research Society-International Conference in India 2013, IISc Bangalore, India, 16- 20th December, 2013.

11. K. Dutta, A. Hazra, **B. Bhowmik**, P.P. Chattopadhyay, P. Bhattacharyya, Mixed Electrolyte: A Controllable Route for Achieving Better Aspect Ratio of TiO_2 Nanotubes, International Union of Material Research Society-International Conference in India 2013, IISc Bangalore, India, 16- 20th December, 2013.

12. P. Bhattacharyya, A. Hazra, **B. Bhowmik**, K. Dutta, Effect of Stoichiometry variation on Alcohol Sensing Properties of Electrochemically Grown TiO_2 Nanotubes, 30th European Conference on Surface Science, Antalya, Turkey, 31st Aug-5th Sep 2014

13. K. Dutta, B. Bhowmik and P. Bhattacharyya, Resonant frequency tuning technique for selective detection of alcohols by TiO2 nanorod based capacitive device, 9-12 October, Toulouse, France, NMDC-2016

14. **B. Bhowmik**, M. Pattanaik, P. Srivastava, A power efficient nanoscale CMOS Operational for Biomedical Application, *National Symposium on Recent advances in Nanoscience Engineering &Technology(RANET)*, IIIT Gwalior, Nov-19-20,2011

Professional Activities

Membership of Professional Bodies:

A) Life Member of Institute of smart structures and system (ISSS), Department of Aerospace Engineering, IISc Bangalore (**LM701**)

B) **Member**, IEEE (92934860)
C) **Member**, IEEE Electron Devices Society
D) **Member**, IEEE Sensor council
E) **Member**, IEEE Nanotechnology Council

F) **Organizing Committee Member,** Research Scholar day celebration 2014, Indian Institute of Engineering Science and Technology (IIEST), Shibpur, West Bengal, India.

G) **Program Committee Member,** National Symposium on Recent advances in Nanoscience Engineering &Technology(RANET), IIIT Gwalior, Nov-19-20,2011