CV of Dr. Sugato Ghosh

Name:	Dr. Sugato Ghosh
Designation:	Assistant Professor, Centre for Interdisciplinary Sciences, JISIASR
Academic Qualification:	M.Tech. from Dept. of Electronics & Telecommunication Engineering, Jadavpur University (2012)
	Ph.D. in Engineering from IIEST Shibpur (2017)
Post Doc Experience:	Project Scientist (CSIR-CGCRI Jadavpur, Kolkata; IIEST Shibpur)
Email id:	sugato@jisiasr.org
Google scholar:	https://scholar.google.co.in/citations?user=kQXXYaAAAAAJ&hl=en

Research Interest:

- New & Renewable Energy, Solar cell fabrication
- Photovoltaic Systems, Self-cleaning of solar PV Systems
- MEMS & NEMS sensors and Micro-Electronics Fabrication.
- Gas Sensing and Bio-sensing (Healthcare application), Environmental Monitoring
- Nano & 2D Material synthesis and application
- Smart & intelligent sensor-based systems for domestic, industrial and health care application.
- Electronics & Instrumentation, Embedded Systems and IoT

Professional Engagement:

March 2022 – till date:	Assistant Professor, Centre for Interdisciplinary Sciences, JISIASR
September 2021 – February 2022:	Assistant Professor, C V Raman Global University, Bhubaneswar, India
April 2020 - September, 2021:	Technical consultant (R&D) at M/s Synchro Electronics, Kolkata
July 2018 - March 2020:	**Project Scientist (Range 1)** at **Sensor and Actuator Division, CSIR – Central Glass and Ceramic Research Institute,** Jadavpur, Kolkata
September 2017 – June 2018:	Scientist, Centre of Excellence for Green Energy & Sensor Systems, IIEST Shibpur

Experience in Fundamental Research:

- MEMS based Gas Sensors, Micro-Fabrication Unit Processes, Toxic Gas Sensing Material Development; R & D related to efficiency improvement a limited batch Fabrication of Crystalline Silicon Solar-Cell & related sensing devices.
- **Specialized training in p-n Junction development for Solar Cell Fabrication (n-type Diffusion ($POCl_3$), p-type (BBr_3) Diffusion)**, **MEMS Microheater based Gas Sensor Development**. Vacuum based Instrumentation.

- Research skill:
    - Hands- on experience in various Clean Room processes for VLSI, including lithography, SCIL (Substrate Conformal Imprint Lithography)
    - Unite processes for c-Si Solar cell development, like texurization, Silicon thermal oxidation, n-type Diffusion ($POCl_3$), p-type (BBr_3) Diffusion etc.
    - RF & Pulsed DC Magnetron Sputtering,
    - Plasma treatment of materials for enhanced sensitivity /selectivity
    - Vacuum metallization including Electron beam evaporation

- Wet chemical process involving Spinners, Gold Electroplating etc.
- Gas sensor measurement system development for different toxic (CO, H_2S, NH_3) and flammable gases (CH_4) in varied concentration.

Experience in Application Based Research (Product development):

- Development of Smart and Intelligent Sensor Systems for human safety in both domestic and industrial area at R & D level.
- Development of smart sensor systems for bio-sensing application, human disease detection in non-invasive way at R & D level.
- Development of UV sanitizer box in industry level for both domestic as well as industrial application (especially for COVID 19 protection).
- Design & development of different microcontroller based remote control systems for domestic applications like remote controlled fan etc.
- **Methanometer:** A portable hand-held low power low cost electronic gadget capable for detection of Methane gas within 20 sec, set different alarm with LED indication for different concentration and display the gas concentration in PPM level in coal mine area.
- **LPG Leak Hunter:** A portable hand-held low power electronic gadget capable for detection of LPG leak within 20 sec and set different alarm with LED indication for different concentration in kitchen and home appliances.
- **Manhole Gas Detector:** A portable hand-held low power electronic gadget capable for detection of Manhole gas within 1 min and set different alarm with LED indication for different concentrations of the gases.
- **Diabetic Breath Analyzer:** A portable hand-held low power electronic gadget capable for detection of Diabetes from human breath within 1 min and set different alarm with LED indication for different levels.

PATENT APPLIED

A portable device for detecting and estimating poisonous and hazardous gases and determining oxygen level - applied.

Thesis Supervision:

M.Tech thesis: 4

- Supervised two Final year M. Tech. Students (IIEST, Shibpur 2017) on
  - *"Design, Simulation and Fabrication of MEMS Based Pressure Sensor"* --- Best Thesis
  - "*Fabrication of 6"X 6" mc-Si solar cell"* --- Achieved 15.5% efficiency.

- Supervised one Final year M. Tech. Student (IIEST, Shibpur 2018) on "*Design & development of electro-dynamic screen for self cleaning application of solar panel*".

- Supervised one Final year M. Tech. Student (Calcutta University, 2021) on "*Non-invasive blood glucose measurement using near-infrared technique*" --- Best Thesis

Projects Involved (Coupled as Research Associate/Scientist)

- **"Nano-biosensors and microfluidics for healthcare (Diabetes detection from breath analysis)"** (A project under CSIR- Nano-bio Mission)

- **"Enhancement of efficiency of c-Si solar cells by 0.2-0.3% through incorporation of Silicon Nitride Nanoparticles on front surface"** (A project under BHEL)

- **"Fabrication of MEMS based LPG gas sensor"** (A project under DST-CSIR Sensor Hub, CGCRI, Kolkata)

- **"Advanced research on thin film silicon solar cells and PV systems"** (A project under Ministry of New & Renewable Resources, Govt. Of India)

- **"Development of an intelligent Recognizer for the Component analysis of Manhole Gas mixture",** (A project under Dept. of Science & Technology, Govt. of India).

Awards/Achievements:

- Fabricated and characterized 6" X 6" monocrystalline silicon solar cells of 19% plus efficiency using facilities at the DST-IIEST Solar PV Hub.

- Successfully **fabricated MEMS Microheater based LPG Sensor and** demonstrated to DST, GOI appointed Review committee consisting of eminent and distinguished scientists of India at DST_CSIR Sensor Hub at CGCRI, Kolkata (probably **1st time in India such demonstration).**

- Awarded 2 times "Certificate of Achievements" from "5I Bhattacharyya Foundation", USA for the development of Manhole gas detector on December 2018 & February 2020.

- BEST PAPER (1st Runner Up) AWARD In 'Tenth International Conference on Sensing Technology (ICST 2016), Southeast University, Nanjing, P. R. China, November 11-13, 2016.

- Chaired a Session "Sensors for Novel Applications II" In 'Tenth International Conference on Sensing Technology (ICST 2016), Southeast University, Nanjing, P. R. China, November 11-13, 2016.

- BEST PAPER OF TECHNICAL SESSION III In 'National Seminar on Thin Film and MEMS Science & Technology (NSTF & MT-14), Jadavpur University, Kolkata, March 21-22, 2014 for the paper "Highly selective and stable methane sensor at reasonably low operating temperature"

Reviewer Of International Journals

- IEEE Sensors.
- Journal of Electronic Materials
- Solar Energy

Papers Published

International SCI Journals (Total Impact Factor: 59.63):

1. S. De, M. Kumar, S. Manna, **Sugato Ghosh**, K. Sinha, D. Adak, S. Maity, R. Bhattacharyya, ***Surface engineering of solar glass covers for soiling related issues by applying electrodynamic screens (EDS)***, Elsevier - Surfaces and Interfaces, 25, 2021, pp-101222. (**Impact factor: 4.837**)

2. I. Das, R. Bhattacharyya, H. Saha, **Sugato Ghosh*, "Improved sensitivity of Co-planar MEMS microheater based methane gas sensor",** IEEE Sensors Journal. Volume 20, issue 23, pp 14132-14140, 2020. DOI: 10.1109/JSEN.2020.3009032 (**Impact factor: 3.301**)

3. **Sugato Ghosh,** D. Adak, R. Bhattacharyya and N. Mukherjee, **"ZnO/γ-Fe_2O_3 Charge Transfer Interface toward Highly Selective H_2S Sensing at a Low Operating Temperature of 30°C"**: ACS Sens. 2017, 2, 1831−1838, DOI: 10.1021/acssensors.7b00636. (**Impact factor: 7.711**)

4. **Sugato Ghosh,** C. RoyChaudhuri, R. Bhattacharyya, H. Saha, and N. Mukherjee, ***"Palladium-silver activated ZnO surface: highly selective methane sensor at reasonably low operating temperature"*** **ACS Applied Materials & Interfaces**, 2014, **6**, 3879-3887. (**Impact factor: 9.229**)

5. **Sugato Ghosh,** R. Bhattacharyya, C. RoyChaudhuri, H. Saha, and N. Mukherjee, ***"Functionalized ZnO/ZnO_2 n–N straddling heterostructure achieved by oxygen plasma bombardment for highly selective methane sensing"*** **Phys. Chem. Chem. Phys**., 2015, 17, 27777. (**Impact factor: 3.676**)

6. B. Chakraborty, **Sugato Ghosh,** N. Das, C. RoyChaudhuri, **Liquid Gated ZnO Nanorod FET Sensor for Ultrasensitive Detection of Hepatitis B Surface Antigen with Vertical Electrode Configuration, Biosensors and Bioelectronics, 2018, 122, 58-67.** (**Impact factor: 10.62**).

7. A. Ghosh, B. B. Show, **Sugato Ghosh,** N. Mukherjee, G. Bhattacharya, S. K. Datta and A. Mondal, ***"Electrochemical synthesis of p-CuO thin films and development of a p-CuO/n-ZnO heterojunction and its application as a selective gas sensor"*** **RSC Advances**, 2014, 4, 51569. (**Impact factor: 3.36**)

8. D. Adak, **Sugato Ghosh**, P. Chakrabarty, A. Mondal, H. Saha, R. Mukherjee and R. Bhattacharya**, "*Self-cleaning V-TiO_2-SiO_2 thin film coatings with enhanced transmission for solar glass cover & related applications*" Solar Energy, 155, 2017, 410-418**. (**Impact factor: 5.742**)**

9. D. Adak, **Sugato Ghosh**, P. Chakrabarty, A. Mondal, H. Saha, R. Mukherjee and R. Bhattacharya, ***Non lithographic block copolymer directed self-assembled and plasma treated self-cleaning transparent coating for photovoltaic modules and other solar energy devices,*** Solar Energy Materials and Solar Cells, **188, 2018, 127-139** (**Impact factor: 7.267**).

10. A. Nandi, S. Mandal, **Sugato Ghosh**, S. Dhar, S. Majumdar, H. Saha and S. M. Hossain ***Application of hybrid rGO-ITO bilayer TCO on a-Si solar cell for performance enhancement***, IEEE Journal of Photovoltaics, Vol. 9, 2019, pp-12-17 DOI: 10.1109/JPHOTOV.2018.2873707 (**Impact factor: 3.887**)

11. S. Ray, **Sugato Ghosh,** H. Ghosh, S. Mitra, C. Banerjee, A. Mondal, H. Saha, S. Jana, S. Das, B. Pal, U. Gangopadhyay, **Fabrication of Nanowire on micro Textured Crystalline Silicon Wafer Before and After Diffusion Process: A comparative study of solar cell performance, Materials Today: Proceedings, 4(14), 2017, 12678-12683**

International / National Conferences:

1. **Sugato Ghosh**, I. Das, D. Adak, N. Mukherjee, R. Bhattacharyya, H. Saha ***"Development of selective gas sensors for manhole gas detection"*** In '**Tenth International Conference on Sensing Technology (ICST 2016)*, Southeast University, Nanjing, P. R. China, November 11-13, 2016***. The paper was awarded as **"BEST PAPER (1st Runner up)".**

2. **Sugato Ghosh,** S. Choudhury, C. RoyChaudhuri, R. Bhattacharyya, H. Saha and N. Mukherjee ***"Highly selective and stable methane sensor at reasonably low operating temperature"*** In**'National Seminar on Thin Film and MEMS Science & Technology (NSTF & MT-14),** Jadavpur University, Kolkata, March 21-22, 2014. The paper was awarded as **"BEST PAPER OF TECHNICAL SESSION III".**

3. D. Adak, **Sugato Ghosh**, R. Bhattacharyya, H. Saha "***Non Lithographic, Block Copolymer Directed Patterning Of Transparent TiO2 Films For Self-cleaning Coatings On Solar Glass Covers***" In '**International Conference on Thin Film (ICTF 2017)*, CSIR-NPL, Delhi, India, November 13-17, 2017***.

4. **Sugato Ghosh**, A. Roy, S. Singh, V. Ojha, P. Dutta, H. Saha, ***"Sensor Array for Manhole Gas Analysis"***. In **International Symposium on Physics and Technology of**

Sensors (IEEE – 2012), Pune, India, March 2012, Accepted & Presented. 978-1-4673-1043-7/12

5. **Sugato Ghosh**, S. Maity, S. Chatterjee, H. Saha.***"Thermal analysis of cantilever MEMS based low power microheater array for the selective detection of explosive and toxic gases"***. In **International Symposium on Physics and Technology of Sensors (IEEE – 2012)**, Pune, India, March 2012. 978-1-4673-1043-7/12.

6. S. Dey, N. Samanta, **Sugato Ghosh**, C. Roychaudhuri, H. Saha. "***A portable fast response sensitive measuring unit for LPG / Methane gas"*** In **First Michael Faraday Institution of Engineering & Technology (IET) India Summit-2012,** Kolkata, India, November 2012.

7. **Sugato Ghosh**, V. Ojha, C. RoyChaudhuri, P. Dutta, H. Saha. "***Portable Sensor Array System for Intelligent Recognizer of Manhole Gas***" In **6th International Conference on Sensing Technology (ICST 2012),** Kolkata, India, December 2012.

8. **Sugato Ghosh,** S. Dey, I. Das, H. Saha **"A Portable Sensitive LPG / Methane Gas Measuring Unit" in WB State Science Congress, Bengal Engineering & Science University,** Howrah, India, February 2013.

9. B. Mondal; J. Das; C. Roychaudhury; Sugato Ghosh; H. Saha, "***Enhanced hydrogen sensitivity and selectivity of ZnO-SnO2 based sensor"***, 2013 Annual IEEE India Conference (INDICON) Mumbai, 13-15 Dec. 2013. DOI: 10.1109/INDCON.2013.6726021.

10. V. Ojha, P. Dutta, H. Saha, and **Sugato Ghosh**. ***Detection of proportion of different gas components present in manhole gas mixture using back propagation neural network***. In **Intentional Conference on Information & Network Technology (ICINT 2011)**, Chennai, India, April 2012. IACSIT – 2012, Vol-37 pp 11-15 ISBN 978-981-07-2068-1

11. V. Ojha, P. Dutta, H. Saha, and **Sugato Ghosh**. ***Application of Real Valued Neuro Genetic Algorithm in Detection of Components Present in Manhole Gas Mixture***. In **Proceedings of The Second International Conference On Computer Science, Engineering And Application (Springer 2012)**, Delhi, India, May 2012. Vol-1, pp.333–340, ISSN 1867–5662

12. V. Ojha, P. Dutta, H. Saha, and **Sugato Ghosh**. ***A Neuro-Swarm Technique for the Detection of Proportion of Components in Manhole Gas Mixture***. In **Proceedings Of International Conference On Modeling, Optimization And Computing (ICMOC 2012)**, Kanyakumari, India, April 2012 Vol-2, pp. 1211-1218.

13. V. Ojha, P. Dutta, H. Saha, and **Sugato Ghosh**. ***Linear Regression Based Statistical Approach For Detecting Proportion Of Component Gases In Manhole Gas Mixture***. In **International Symposium on Physics and Technology of Sensors (IEEE – 2012)**, Pune, India, March 2012.

14. V. Ojha, P. Dutta, H. Saha, and **Sugato Ghosh**. ***A Novel Neuro Simulated Annealing Algorithm for Detecting Proportion of Component Gases in Manhole Gas Mixture***. In

Proceedings Of International Conference On Advances In Computing And Communications (ICACC 2012) IEEE, Kochi, India, August 2012.