# Dr. Susmita Biswas

**B. Tech (ECE), M. Tech(ECE-VLSI & Micro Electronics), PhD (Engineering), Assistant Professor (Fr.CRCE)**

## CONTACT


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researchgate.net/profile/Susmita-Biswas-4

scholar.google.com/citations?user=51A5KRIAAAAJ&hl=en


## TECHNICAL SKILLS

Proficiency in handling characterization units such as photoluminescence spectroscopy unit, UV - Visible spectrophotometer, atomic force microscope, I-V & C-V measurement units

Proficiency in handling ball mill system & electrochemical etching unit

Proficiency in handling wafer cleaning and texturization unit

Proficiency in handling diffusion furnace, screen printer and belt furnace system

Working knowledge in MATLAB

## PROFILE

PhD (Engineering) degree awarded from Indian Institute of Engineering Science and Technology, Shibpur in 2023. Possess B. Tech in ECE (JIS College of Engineering | WBUT, 2012), M. Tech in ECE - VLSI & Micro Electronics (Institute of Engineering and Management | WBUT, 2014). Have keen research interests in crystalline silicon solar cell, thin film silicon solar cell, silicon nanostructure based 3$^{rd}$ generation photovoltaics (hot carrier solar cell & spectral converters for solar cells) and optoelectronics with 08 journal publications, 05 conference articles, and 01 patent (filed) so far. Acquired research experiences at various positions in sponsored projects and fellowship schemes from a) Ministry of New and Renewable Energy, Government of India (Junior Research Fellowship), b) IIEST, Shibpur (financial assistance), and c) Council of Scientific & Industrial Research, Government of India (Senior Research Fellowship). Now, looking forward to make use of the acquired knowledge and research experiences in an appropriate teaching position.

## WORK EXPERIENCE

**January,2026 – Present**

Assistant Professor in Fr. Conceicao Rodrigues College of Engineering

Job Responsibilities: Responsibilities include teaching students on graduate-level Electronics and Computer Science courses, conducting research as well as overseeing research projects in this institute.

**August, 2023 – January,2026**

Associate Professor in University of Engineering and Management, Kolkata

Job Responsibilities: Assistant Head and Innovation & Entrepreneurship Development Cell (IEDC) coordinator of CSE (IoT, CS, BT) Department. Responsibilities include teaching graduate level Electronics and Communication Engineering allied courses, conducting research as well as overseeing research projects in this University.

**March, 2023 – July, 2023**

Assistant Professor (Electronics and Communication Engineering) in Hooghly Engineering & Technology College (HETC)

Job Responsibilities: Responsibilities include teaching students on graduate-level Electronics and Communication Engineering courses, conducting research as well as overseeing research projects in this institute.

## TECHNICAL AREAS OF INTEREST

**Teaching Interests**

Basic Electronics,

Digital Electronics,

Analog electronics,

VLSI Design,

Circuit theory,

Communication Engineering,

Other courses can also be prepared when situation demands

**Research Interests**

Renewable Energy,

Photovoltaic devices,

Semiconductor device physics,

Optoelectronics,

Nanotechnology,

Silicon nanostructures,

Material characterization

## FELLOWSHIPS AND WORK EXPERIENCES IN RESEARCH PROJECTS

**21.05.2015-30.06.2017**

Junior Research Fellow, Advanced Research on thin film silicon solar cells and PV systems, Ministry of New and Renewable Energy, Government of India

**01.07.2017-30.04.2018**

Institutional financial assistance for PhD scholar, Indian Institute of Engineering Science and Technology (IIEST), Shibpur

**01.05.2018-31.05.2020**

Senior Research Fellow (Direct), Council of Scientific & Industrial Research, Government of India

## DETAILED ACADEMIC RECORDS

**2014 – 2023**

**PhD in Engineering**

*School of Advanced Materials, Green Energy and Sensor Systems (SAMGESS), Indian Institute of Engineering Science and Technology (IIEST), Shibpur, India*

*Thesis Title: Photoluminescence properties of mechanochemically synthesized silicon quantum dots.*

*Supervisors: Dr. Sumita Mukhopadhyay, SAMGESS, IIEST, Shibpur and Dr. Syed Minhaz Hossain, Department of Physics, IIEST, Shibpur*

- Doctoral research interests include investigation of the optoelectronic properties especially photoluminescence behaviour of colloidal silicon nanoparticles in order to understand their usability in futuristic 3rd generation photovoltaics like hot carrier solar cell. A mechanochemical synthesis technique was utilized for the synthesis of colloidal suspension of freestanding silicon/silicon oxide core/shell nanostructures with a narrow size distribution of silicon cores in a quantum size range. The synthesized nanoparticles were investigated thoroughly using different structural, morphological and optoelectronic characterizations. Signature of phonon mode confinement and elongated hot carrier lifetime (in nanosecond range) was observed from different characterizations. This amount of time is sufficient to collect hot carriers through very narrow energy window of appropriate energy selective contacts before they cool down to the conduction band edge. Synthesized nanoparticles can be utilized as the active material or light absorbing material for the hot carrier solar cell. However, runny texture of the synthesized colloidal sample inhibits practical device implementation. Therefore, silicon/silicon oxide core/shell nanostructures are embedded in xerogel matrix maintaining essential structural and optoelectronic properties of silicon quantum dots in order to achieve a solidified light absorbing material for practical hot carrier solar cell.

**2012-2014**

**M. Tech in ECE (Specialization - VLSI & Micro Electronics), DGPA = 9.34**

*Institute of Engineering and Management (IEM), West Bengal University of Technology, West Bengal, India*

*Thesis Title: Modeling and simulation of some basic characteristic of MOSFETs.*

*Thesis Supervisor: Prof. (Dr.) K. K. Ghosh, Department of Electronics & Communication Engineering, IEM, Kolkata, India.*

- Research in M. Tech thesis includes theoretical investigation on the effect of quantum confinement on different parameters like density of states, energy distribution, and carrier concentration for the restriction on different dimensions of MOSFETs. At the same time, some physical phenomena, such as short channel effect on the threshold voltage of MOSFET and Drain Induced Barrier Lowering (DIBL), which are negligible in large-dimension MOSFETs but become very important in the case of small-dimension MOSFETs, were also studied and simulated in MATLAB. In addition to this, the study on a nanometer range device named Ballistic Transistor was performed along with the graphical representation of conductance of channel of this device as a function of energy.

## PROJECT FUNDS

Project Title: Realization of Spectral Converters for Photovoltaic Devices (Grant-in-Aid research scheme, IEM-UEM Group)
Fund: Rs. 1,00,000/-
Principal Investigator: Dr. Susmita Biswas
Duration: 2 Years

Project Title: Spectral Down Shifting Utilizing Silicene (Grant-in-Aid research scheme, IEM-UEM Group)
Fund: Rs. 15,000/-
Principal Investigator: Dr. Susmita Biswas
Duration: 2 Years

Project Title: ऊर्जा (Urja): Luminescent Quantum Dot Ink for Photonic Devices (Grant-in-Aid research scheme, IEM-UEM Group)
Fund: Rs. 20,000/-
Principal Investigator: Dr. Susmita Biswas
Duration: 1 Years

Project Title: सूक्ष्मरक्षक: Oncosentinel-N: Nanorobots for Targeted Oncological Treatment (Grant-in-Aid research scheme, IEM-UEM Group)
Fund: Rs. 20,000/-
Principal Investigator: Dr. Susmita Biswas
Duration: 1 year

Project Title: Glucose Guardians: Precision Diabetes Control through Nanorobotic Therapy (Grant-in-Aid research scheme, IEM-UEM Group)
Fund: Rs. 19,500/-
Principal Investigator: Dr. Susmita Biswas
Duration: 1 year

**2008-2012**

**B. Tech in ECE, DGPA - 8.30**

*ECE Department, JIS College of Engineering, West Bengal University of Technology, West Bengal, India*

**2006-2008**

**Higher Secondary in Science (+2 Level Examination), Percentage - 79.20**

*Habra Kamini Kumar Girls' High School, West Bengal Council of Higher Secondary Education, West Bengal, India*

**2004-2006**

**Madhyamik Pariksha (Secondary Level Examination), Percentage - 82.00**

*Habra Kamini Kumar Girls' High School, West Bengal Board of Secondary Education, West Bengal, India*

## RESEARCH PUBLICATIONS

**Citations – 94, h-index - 6 (Ref. ResearchGate)**

**Research Papers in Peer Reviewed Journals – 08**

*(1)* ***S. Biswas****, A. Nandi, S. Mukhopadhyay, P. Chaudhuri, H. Saha, and M. H. Syed, "Mechanochemical synthesis of quasi monodispersed core-shell silicon nanostructure," Applied Surface Science, vol. 494, pp. 326-334, 2019. (SCI Journal)*

*(2)* ***S. Biswas****, A. Nandi, S. Basu, S. Chakrabarty, S. Mukhopadhyay, H. Saha, and S. M. Hossain, "Photo assisted negative differential resistance in porous silicon: A potential nano-structure for hot carrier solar cell," Materials Today: Proceedings, vol. 39, pp. 1930-1933, 2021. (Scopus Indexed Journal)*

*(3)* ***S. Biswas****, A. Nandi, U. Ghanta, B. Jana, S. Mukhopadhyay, H. Saha, and S. M. Hossain, "Hot-carrier radiative recombination through phonon confinement in silicon nanocrystals embedded in colloidal xerogel matrix," Journal of Applied Physics, vol. 130, no. 3, pp. 033102, 2021. (SCI Journal)*

*(4) U. Ghanta, M. Ray,* ***S. Biswas****, S. Sardar, T. K. Maji, S. K. Pal, N. R. Bandyopadhyay, B. Liu, and S. M. Hossain, "Effect of phonon confinement on photoluminescence from colloidal silicon nanostructures," Journal of Luminescence, vol. 201, pp. 338-344, 2018. (SCI Journal)*

*(5) S. Chakrabarty, S. Mandal,* ***S. Biswas****, A. K. Pramanick, M. Ray, and S. M. Hossain, "Trap-assisted switching in silicon nanocrystal based pin device," IEEE Transactions on Device and Materials Reliability, vol. 18, no. 4, pp. 620-627, 2018. (SCIE Journal)*

*(6) A. Nandi,* ***S. Biswas****, S. Chakrabarty, S. Majumdar, H. Saha, M. Saini, and S. M. Hossain, "Development of graphene capped silicon–silicon oxide core–shell nano-structure: Charge trapping characteristics at the interfaces," Applied Materials Today, vol. 13, pp. 370-380, 2018. (SCIE Journal)*

*(7) N. C. Mandal,* ***S. Biswas****, S. Acharya, T. Panda, S. Sadhukhan, J. R. Sharma, A. Nandi, S. Bose, A. Kole, G. Das, and S. Maity, "Study of the properties of SiOx layers prepared by different techniques for rear side passivation in TOPCon solar cells,"*

## TRAINING AND INTERNSHIPS

**One Month Summer Training on 'SOLAR PHOTOVOLTAICS and SOLAR THERMAL SYSTEMS'**

During 22nd June-21st July, 2010 at Bengal Engineering & Science University (BESU), currently known as Indian Institute of Engineering Science and Technology (IIEST), Shibpur, India.

Objective - To obtain core knowledge of solar photovoltaic and solar thermal systems. In addition, an industry visit to a solar system manufacturing company Vikram Solar (Falta, West Bengal) was also organized.

Awarded certification with $A^+$ Grade.

## PERSONAL DETAILS

Susmita Biswas (Female, Married)
DOB - 20-10-1990,
Nationality - Indian (by Birth)
Languages - English & Bengali (Read, Write, & Speak), Hindi (Speak)

Parents - Shyamal Chandra Biswas, Retired Employee of Life Insurance Corporation of India
& Late. Sabita Biswas (Homemaker)

Spouse - Ardhendu Kundu (B.Tech in ECE, M.E. in ETCE, PhD in Engineering,
Senior Solutions Consultant – Simulation, BEACON (Mumbai)

*Materials Science in Semiconductor Processing, vol. 119, pp. 105163, 2020. (SCI Journal)*

*(8) N. C. Mandal, S. Acharya, **S. Biswas**, T. Panda, S. Sadhukhan, J. R. Sharma, S. Bose, G. Das, A. Kole, A. Nandi, and S. Maity, "Evolution of PERC from Al-BSF: Optimization based on root cause analysis," Applied Physics A, vol. 126, no. 7, pp. 1-10, 2020. (SCI Journal)*

### Research Papers in Peer Reviewed Conferences - 05

*(1) **S. Biswas**, A. Nandi, A. Dhara, A. Baral, H. Saha, N. Mukherjee, and S. M. Hossain, "Effect of Centrifugation time on the optical properties of colloidal silicon nanoparticle," International Conference on Functional Nano-Materials (IC-FNM-2016).*

*(2) **S. Biswas**, A. Nandi, S. Basu, S. Chakrabarty, S. M. Hossain, S. Mukhopadhyay, and H. Saha, "Photo assisted resonant tunnelling in porous silicon: a potential nano-structure for hot carrier solar cell," International Conference on Solar Energy Photovoltaics (ICSEP-2019).*

*(3) **S. Biswas**, S. Roy, and P. Chakraborty, "Ensemble Based Prediction Analytics Model for Photoluminescence Intensity Decay in Silicon Nanostructures," International Conference on Data Management, Analytics & Innovation (ICDMAI-2025).*

*(4) **S. Biswas**, S. Roy, R. Sarkar and R. Santra, "Optimization and Comparison of Machine Learning Models for Predictive Modeling of Photoluminescence spectrum of freestanding colloidal Silicene ink: A Multi-Factor Performance Evaluation Framework" International Conference on Advanced Computing and Systems (AdComSys 2025).*

*(5) S. Roy, **S. Biswas**, N. Saha, A. Ghosh, R. Sarkar and R. Santra, "AI-Driven Photoluminescence Modeling and Experimental Study of Luminescent Silicon Quantum Dot Ink for Quantum Communication Applications," 1st International Conference on Artificial Intelligence for Computing, Astronomy, and Renewable Energy (IEEE AICARE, 2025).*

### Patent filed - 01

*(1) S. Majumdar, A. Nandi, **S. Biswas**, and H. Saha, "In-situ generated silicene (2D Si) acting as semiconductor ink," Application No.: 201931032550, Filing date: 12.08.2019 at 16:14:26.*

## WEBINARS, SEMINARS, WORKSHOPS, AND CONFERENCES, FACULTY DEVELOPMENT PROGRAMME ATTENDED

*[1] Participation in "Workshop on High Performance Computing (HPC) Technologies" organized by S.N. Bose National Centre for Basic Sciences (SNBNCBS) from June 18–20, 2025.*

*[2] Participation in AICTE Recognized Faculty Development Programme on the topic "Smart Grid and Renewable Energy Sources" from 23.09.2024 to 27.09.2024 (One Week). The Faculty Development Programme was organized by National Institute of Technical Teachers Training & Research, Chandigarh.*

*[3] Participation in one week hands on training programme on the topic "Fabrication and Characterization of Advanced Photovoltaic Devices" organized by Department of Physics, Indian Institute of Engineering Science & Technology (IIEST), Shibpur, supported by DST-IIEST Solar PV Hub, in association with Indian Institute of Technology (ISM), Dhanbad, Under the aegis of DST-STUTI Programme, Funded by Department of Science and Technology, Govt. of India from 12th to 18th December, 2022.*

## REFERENCES

Prof. Hiranmay Saha,
Ex-Visiting Professor,
School of Advanced Materials,
Green Energy and Sensor Systems,
Indian Institute of Engineering
Science and Technology, Shibpur,
Howrah, West Bengal, India
sahahiran@gmail.com

Dr. Syed Minhaz Hossain,
Head & Associate Professor,
Department of Physics,
Indian Institute of Engineering
Science and Technology, Shibpur,
Howrah, West Bengal, India
Shminhaz@physics.iiests.ac.in

Dr. Sumita Mukhopadhyay,
Assistant Professor,
School of Advanced Materials,
Green Energy and Sensor Systems,
Indian Institute of Engineering
Science and Technology, Shibpur,
Howrah, West Bengal, India
mukhopadhyay_sumita@yahoo.co.in

*[4] Participation in a webinar on the topic "Smart Green Energy Systems" organized by Shivajirao Kadam Institute of Technology and Management, Indore, Madhya Pradesh, India in association with Autosys, Indore, Madhya Pradesh, India on 27th June 2020.*

*[5] Participation in a webinar on the topic "Recent Advances in Antenna & Microwaves" organized by Department of Electronics and Telecommunication Engineering, Shri. G. S. Institute of Technology & Science, Indore, Madhya Pradesh, India in technical collaboration with Antenna Test and Measurement Society (ATMS), Ahmedabad, Gujarat, India during 1st and 2nd June 2020.*

*[6] Paper Presentation in "3rd International Conference on Solar Energy Photovoltaics (ICSEP-2019)" organized by KIIT Deemed to be University, Bhubaneswar, Odisha, India during 19th - 21th December 2019.*

*[7] Paper Presentation in "International Conference on Functional Nanomaterials (IC-FNM 2016)" organized by Center of Excellence (CoE) on Micro-Structurally Designed Advanced Materials under TEQIP (II) and Dr. M. N. Dastur School of Materials Science and Engineering (MND-SMSE) of Indian Institute of Engineering Science and Technology (IIEST), Shibpur, West Bengal, India during 28th-29th September 2016.*

*[8] Paper Presentation in "Research Scholars Colloquium (RSC-2016)" organized by Indian Institute of Engineering Science and Technology (IIEST), Shibpur, West Bengal, India during 23rd-24th August 2016.*

*[9] Participation in "Circuit Design Workshop" organized by SPIE Student Chapter, JIS College of Engineering, Kalyani, West Bengal, India on 6th March 2010.*

## EXTRACURRICULAR ACTIVITIES & HOBBIES

**Extracurricular Activities**

*[1] Faculty advisor of IEEE Computational Intelligence Society (CIS) Student Branch Chapter in 2025.*

*[2] Former Graduate Student Member of Institute of Electrical and Electronics Engineers (IEEE) in 2013.*

*[3] Former Student Member of Society of Photo-Optical Instrumentation Engineers (SPIE) during 2009-2011.*

**Hobbies**

*[1] Passionate about singing.*

Susmita Biswas

***Dated 9th February 2026, Kolkata*** ***Susmita Biswas***