Personal Profile

Prof. Pradip Kumar Kalita
Professor, Department of Physics
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Educational Profile

Ph.D.	University of Gauhati, Guwahati, Assam; 2000
	Supervisor: Prof. H L Das & Prof. B K Sarma
M.Sc./M.Tech/	University of Gauhati, Guwahati, Assam; 1990
M.Com./M.A./	Subject: Physics
M.Ed etc.	Specialization: Solid State Physics
B.Sc./B.Tech/	University of Gauhati, Gauhati, Assam; 1988
B.Com./B.A. etc.	Subject: Physics

Professional Experience

Professor, Department of Physics Rajiv Gandhi University, Arunachal Pradesh, India	September, 2015-till date
Associate Professor, Department of Physics, Guwahati College, Guwahati, Assam India	August 2007- September, 2015
Assistant Professor, Department of Physics, Guwahati College, Guwahati, Assam India	August 1995- August 2007

Administrative Experience

Dean, Faculty of Basic Sci., IT & Engg Rajiv Gandhi University, Arunachal Pradesh, India	August, 2018- July 2021
Head of Department, Department of Physics, Rajiv Gandhi University, Arunachal Pradesh, India	July 2021- July 2024
Head of Department, Department of Physics, Rajiv Gandhi University, Arunachal Pradesh, India	September 2024- Till date (Second term)

Awards & Honours

Membership of Professional Bodies

1. Member of Material Research Society of India (Life Member)
2. Member of Indian Physics Teacher Association (Life Member)
3. Member of Indian Physics Association (Life Member)
4. Member of Physics Association of North East (Life Member)

Research Interests

- Thin Films
- Photoconductivity
- Nano-Optoelectronics
- Design and simulation of nanoscale devices
- Theoretical modelling of nanostructures

Research Projects:

1. SERS-DST sponsored research project titled "Development and characterization of $CsSnGeI_3$ based solar cell devices through theoretical and experimental approach." Principal Investigator, (**Ongoing**)

Research Publications *(last ten years)*

1. TCAD study of CIGS/CZTS double absorber solar cells for high-efficiency photovoltaic applications; Bhattarai Sagar; Shrivastav Nikhil ; Saikia Lakshi; Kalita P K; Sudhakara Reddy M; Radhika S.; Madan Jaya; Pandey Rahul; J Optics; **2025**; https://doi.org/10.1007/s12596-025-02769-6
2. Memristive behaviour of Al/rGO-CdS/FTO device at different temperatures: A MATLAB-integrated study; Kalita A J; Sharma M; Das Hirendra; Kalita P K; *Physica E-Low dimensional systems and Nanostructures;* **2025**, 165, 116107
3. Observation of voltage dependent negative differential resistance (NDR) in SnS2-GO nanocomposites; Tangjang, L.; Gogoi A P; Das Hirendra; Bhattarai Sagar; Kalita P K; *Physica E-Low dimensional systems and Nanostructures;* **2025**, 165, 116102
4. Influence of capping agents for controlling structural and optical properties of copper chalcogenide (CuS) nanoparticles; Khongiang L; Deb S; Kalita P K; *J Phys: Conf. Series*; **2024**, 2919, 012008
5. Fabrication of highly sensitive memristive device using NiO nanoparticles synthesized by single step wet chemical method; Pathak B; Kalita P K; Roychoudhury J P; Dutta A; *Physica Scripta*; **2024**, 99, 05904.
6. Defect controlled space charge limited conduction in CdS nanostructured sandwich structure; Nanung Yowa; Tangjang, L.; Das H. N.; S Deb; Kalita P. K.; *Mater Sci Engg B;* **2024**, B 304, 117353.

7. Optical properties of chemically synthesized SnS_2 nanostructure and study of current transport mechanism in Schottky and heterojunction diodes; Tangjang, L.; Singha, P.; Nanung Y.; Kalita, P. K.; *J Mater Sci: Mater Electron*; **2024**, 35, 219
8. Optoelectronics characteristics of chemically synthesized $Cu(In_{1-x}Ga_x)Se_2$ based Schottky and heterojunctions: Barman, B.; Handique, K.; Kalita, P. K: *Optical Mater.* **2023**, 145, 114420
9. Role of excess-carrier generation and recombination in memristivity: Roychoudhury, J. P.; Pathak, B.; Kalita, P. K; Dey, S.; Nath, N. M.; *Materials Today: Proceeding* **2023,** https://doi.org/10.1016/j.matpr.2023.05.579
10. Photo-induced single-electron tunnelling based Coulomb staircase effect observed at high applied bias in ZnSe/CdSe core-shell quantum dots: Handique, K.; Barman, B.; Kalita, P. K; Das, H. N; *Optical & Quantum Electron.;* **2024**, 56, 357
11. Effect of Zn^{2+} ion concentration on the optoelectronic properties of chemically synthesized ZnSe nanorods: Handique, K.; Barman, B.; Kalita, P. K.:*Physica B*; (**2024**) 674, p-415571
12. Observation of negative differential Resistance(NDR) in chemically synthesized $CuGaSe_2$ nanorods: Barman, B.; Handique, K.; Kalita, P. K: *Mater. Lett.:* **2024**, 357, 135638
13. Photo-response in chemically synthesized ZnSe nanorod for its application as photosensor: Handique, K.; Barman, B.; Kalita, P. K.: *Physica Scripta*; **2023**, 98, 11701
14. Performance improvement of CZTS-based hybrid solar cell with double hole transport layer using extensive simulation: Bhattarai, Sagar; Khaled Hussein, M.; Madanc, Jaya; Pandeyc R.; Samajdard, D.P.; Kalita, P.K.; Rashed Ahmed Nabih Zaki; Ansarih, Mohd Zahid; Amami, Mongi: *J Phys. Chem Solids;* **2023,** 183, 111641
15. Optoelectronic characterization of chemically synthesized $Cu_xIn_{1-x}Se_2$ nanostructure for suitable application as photoconductive device: Barman; Handique, K.; B.; Kalita, P. K.: *J Phys. Chem Solids;* **2023** https://doi.org/10.1016/j.jpcs.2023.111700
16. Modelling and Analysis of ZnO Piezoelectric-Based Circular Diaphragm Pressure Sensor : Singh, M. Shamjit; Kalita, P. K.; Singh, H. S.; Meetei, M. Sanju: *Inter. J. Engg. Trends and Tech*; **2023**; 71, p-84
17. Piezoelectric-Based Square Diaphragm Pressure Sensor Modelling and Analysis using PZT-5H and PZT-5A: Singh, M. Shamjit; Kalita, P. K.; Meetei, M. Sanju: *Inter. J. Electrical and Electronics Engg.*; **2023**, 10, p-1-8
18. Comparative study of distinct halide composites for highly efficient perovskite solar cells using a SCAPS-1D simulator: Bhattarai, Sagar; Pandey Rahul; Madan, Jaya; Tayeng, Soney; Kalita, P. K.; Ansari, Mohd Zahid; Lamia, Ben; Amami, Mongi; Hossain M. Khalid : *RSC Adv.*; **2023**; 13, p-26851
19. Designing an Efficient Lead-Free Perovskite Solar Cell Through Computational Method : Bhattarai, Sagar; Kalita P. K.; Hossain Ismail; Saad Alsubaie, Abdullah; Khaled Hussein; Ansari, Mohd Zahid; Janicek, Petr: *Crystal;* **2023**; 13, 1175.
20. Photo electronic properties of molar concentration varied nanostructured ZnO for their photo-detecting viability in visible range: Pathak, B.; Kalita, P. K.; *Physica B*; **2023**: 650, p-414562
21. Optoelectronic studies of Copper sulfide selenide (CuSSe) nanorods for its application as a potential absorber layer in photovoltaics: Barman, B.; Kalita, P. K.; *Optical Mater*; **2023**: 138, p-113642
22. Coulomb-blockade oscillation in CdS, ZnS and CdS/ZnS core-shell quantum dots: Kalita P. K.; Nanung Yowa; Das H. N.; *Physica Scripta*; **2023**: 98, p-025820

23. Structural, Optical and Ionic Properties of PVA Capped CuS Quantum Dots: Nath, S. K,; Kalita, P K.; : J Nano Res; **2023**: 7, p-119-133
24. Effect of growth condition on the structural, optical and ionic characteristics of chemically synthesized CuS Nanostructures in starch matrix: Nath, S. K,; Kalita, P K.; : *Bulgarian J Phys;* **2023**, 50, p-280-300
25. Plant based Silver Quantum Dots for Evaluation of Mem-capacitive Behaviour: Pathak, B.; Das, H. N.; Kalita, P. K.; : *J Electronic Mater;* **2023** Vol-52, pp-6840-6850
26. Shell induced optoelectronic characteristics of chemically synthesized PbO/ ZnO core/shell nanocomposites for memcapacitive application: Pathak, B.; Amoua, J; Kalita, P. K.; : *Physica E- Low-dimensional Systems and Nanostructures* **2022**; 139, p-115157
27. Nanomaterials for Next Generation Energy Storage Applications: Pathak, B.; Das, H. N.; Kalita, P. K.; : *MRS Communication;* **2022** 12, p285-294
28. Modulation of optoelectronic properties of ZnO/PbO nanocomposite for memcapacitive application: Pathak, B.; Amoua, J; Kalita, P. K.; : *Mater Sci in Semicon. Processing.;* **2022,** vol. 149, p-106892
29. Optoelectronic characterization of ZnO/starch composite for its application as Schottky diode and photoconductor: : Deb, S.; Kalita, P. K.; :*J Mater Sci : Mater Electron* **2022 http://** doi.org/10.1007/s10854-022-08710-y
30. Green synthesis of copper sulfide (CuS) nanostructures for heterojunction diode applications: Deb, S.; Kalita, P. K.; :*J Mater Sci : Mater Electron* **2021** https://doi.org/10.1007/s10854-021-06879-2
31. Influence of back surface field layer on enhancing the efficiency of CIGS solar cell: Barman, B.; Kalita, P. K.; *Solar Energy* **2021**, *216*, 329-337
32. Temperature dependent structural, optical and electrical properties of CuS nanorods in aloe vera matrix: Nath, S. K.; Kalita, P. K.; *Nanostructures & Nano-Objects* **2021**, *25*, 100351-(9pp)
33. Optical properties of PbO/ZnO core/shell dispersed in PVP matrix : Pathak, B., Roychoudhury, J. P.; Kalita, P. K.; Aomoa, N.; *Materials Today: Proceeding,* **2021**, *46*, 6196-6200
34. Synthesis and characterization of chemically synthesized CuSe nanoparticles for photovoltaic application: Barman, B.; Handique, K.; Nanung, Y.; Kalita, P. K.; *Materials Today: Proceeding,* **2021**, 46, 6213-17
35. Effect of temperature on the optical properties of chemically synthesized CdSe nanostructures: Handique, K.; Siboh, D.; Nanung, Y., Barman, B.; Kalita, P. K.; *Materials Today: Proceeding,* **2021**, *46*, 6312-17.
36. Opto-electronic characterization of starch capped zinc chalcogenides (core-shell) nanocomposites and their application as Schottky device: Deb, S.; Kalita, P. K.; Datta, P.; *Physica Scripta* **2020**, *95*, 095810-(12pp)
37. Effects of cadmium ion concentration on the optical and photo-respon se properties of CdSe/PVP nanocomposites for white light sensing application: Handique, K.; Kalita, P. K.; *Applied Phys A: Mater. Sci & Process* **2020,** *126*, 755-(12pp)
38. Effect of Weak Confinement on the Optical Properties of Chemically Synthesized ZnS Nanoparticles: Handique, K.; Kalita, P. K.; *J Nano & Electronic Phys* **2020**, *12*, 04015-(5pp)
39. Theoretical Investigation on Performance Enhancement of CIGS Based Solar Cells: Barman, B.; Kalita, P. K.; *J Nano & Electronic Phys* **2020**, *12*, 06036-(4pp)
40. Optical Properties of poly-vinyl pyrrolidone encapsulated PbS/CdS core-shell quantum dots : Handique, K.; Barman, B.; Nanung, Y.; Kalita, P. K.; *Carbon-Sci & Tech.* **2019**, *11*, 29-35

41. A study on growth of ZnSe quantum dot through chemical route : Siboh, D.; Handique, K.; Kalita, P. K.; *Carbon-Sci & Tech.* **2019**, *11*, 36-42
42. Memristive, memcapacitive and meminductive behaviour of single and co-doped cadmium selenide nanocomposites under different doping environment: Das, B.; Devi, J.; Kalita, P. K.; Datta, P.; *J Mater Sci: Mater Electron* **2018**, *29*, 546-557
43. Structural and optoelectronic properties of glucose capped Cu doped ZnO/ Zn(OH)2 nanosheets : Patwari, G.; Singha, R.; Kalita, P. K.; *Materials Today: Proceeding*, **2018**, *5*, 2197-2206
44. Quantum confinement induced shift in energy band edges and band gap of a spherical quantum dot: Bora, P.; Siboh, D., Nath, N. M.; Kalita, P. K.; Sarma, J. K.; *Physica B: Phys of Condensed Mater.* **2017**, *530*, 208-214
45. Microstructural and Optoelectronic properties of green synthesized ZnS nanostructures: Deb, S.; Kalita, P. K.; Datta, P.; *Inter J Nanosci.* **2017**, *16*, 1760032-1-9
46. Determination of shift in energy of band edges and band gap of ZnSe spherical quantum dot.: Siboh, D., Nath, N. M.; Kalita, P. K.; *AIP conference Proceedings* **2017,** *1942*, 50111-4
47. Effect of capping agents on the optical properties of synthesized CuS nanostructures: Nath, S. K.; Kalita, P. K.; *Materials Today: Proceeding*, **2017**, *4*, 3972-3978
48. Effect of self-assembled ZnO2 intermediate layer on the growth of starch capped ZnO/ZnS core/shell nano composites through chemical bath deposition method: Deb, S.; Kalita, P. K.; Datta, P.; *Materials Today: Proceeding*, **2017**, *4*, 3994-4000
49. Structural and optoelectronic properties of glucose capped Al and Cu doped ZnO nanostructures: Patawari, G.; Singha, R.; Kalita, P. K.; *Mater. Sci.-Poland* **2016**, *34*, 69-78
50. Optical properties of DNA induced starch capped PbS, CdS and PbS/CdS nanocomposites: Das, D.; Konwar, R.; Kalita, P. K.; *Indian J Phys.* **2015**, *89*, 845-855
51. Synthesis and characterization of Al-doped ZnO nanostructures in gluose matrix: Patwari, G.; Singha, R.; Kalita, P. K.; *J Basic & Appl. Engg. Res*, **2015,** *19*, 1728-31
52. Excess sulphar induced structural and optical properties of Green synthesised CuS nanostructures: Nath, S. K.; Kalita, P. K.; *J Basic & Appl. Engg. Res*, **2015,** *19*, 1684-87
53. Synthesis of ZnO/ZnS core/shell nanostructures for its possible fabrication as photoconductors: Deb, S.; Kalita, P. K.; Datta, P.; *J Basic & Appl. Engg. Res*, **2015,** *19*, 1785-89.

https://scholar.google.com/citations?view_op=search_authors&mauthors=Pradip+Kumar+Kalita&hl=en&oi=ao

Patent: -

Book/Book Chapter published

1. Handique, K.; Barman, B.; Kalita, P. K.; Design and stimulation studies of CdTe and CIGS based solar cells using SCAPS-1D.: *Frontiers in Basic Physics and*

Applications, Eds. Nath, K. J.; Banik, D. K.; Nath, N. M. and Banik, S. K.; Barnagar College, Barpeta **2020** pp 58-69

2. Nath, S. K.; Kalita, P. K.; Synthesis and characterization of starch capped CuS nanostructures on low molar concentration.: *Spectrum: Recent trends in Multiplinary Research* Eds. Saikia, R.; Eduoxia Research Centre, Guwahati, **2020** pp11-21
3. Handique, K.; Barman, B.; Siboh, D.; Nanung, Y.; Kalita, P. K.; Synthesis and characterization of CdS/PbS core/shell nanocomposites for photovoltaic application.: *Advances in Nuclear Physics and Condensed Matter*, Eds. Singh, L. K.; **2019** pp.182-190
4. Handique, K.; Roy, M.; Kalita, P. K.; On an artificial intelligence based material search engine: *Rengani* Eds. Gogoi, Rijumoni & Gogoi, Ritamoni, Madhavdev Mahavidyala Prakashan, Lakhimpur, **2017** pp.182-189
5. Nath, S. K.; Kalita, P. K.; Chemical synthesis of Cu2S/PVA quantum dots.: *Treasure Trove*, Eds. Singh, S. S.; B H College Publication, Howly **2016** pp.13-17
6. Roychoudhury, J. P.; Kalita, P. K.; Effect of atmospheric oxidation on chemical synthesis of ZnS nanostructures.: *Treasure Trove*, Eds. Singh, S. S.; B H College Publication, Howly **2016** pp.169-175
7. Kalita, P. K.; Nanotechnology: A technological breakthrough towards a new world of fantasy.: *Science Spectrum*, Eds. Sarma, Kavita.; Bhabani Press, Guwahati **2015** pp.160-183

Research guidance

Ph.D scholars:

1. (For ongoing scholars)

   (i) Full name of the Scholar: Yowa Nanung

   Topic of research: *Studies of opto-electronic properties of transition metal doped CdS/ZnS core/shell nanocomposites.*

   Year of PhD degree: ***Thesis to be submitted***

   (ii) Full name of the Scholar: Lohnye Tangjang

   Topic of research: *Development of 2D Nanocomposites for Photoelectronic Device Application*

   Year of PhD degree: *Ongoing*

   (iv) Full name of the Scholar: Prerona Singha

   Topic of research: *Electron transport in 2D TMD quantum nanostructures and its application in nanoelectronics*

   Year of PhD degree: *Ongoing*

   (v) Full name of the Scholar: M Shamjit Singh

Topic of research: *Piezoelectric Pressure Sensors: Design, Simulation and Optimization for Different Modes of Operation.*

Year of PhD degree: *Ongoing*

2. (For degree awarded scholars)

(i) Full name of the Scholar: Barnali Barman

Topic of research: *Studies on photoresponse characteristics of chemically synthesised CIGS nanoparticles for Photoconductive devices*

Year of PhD degree: 2025

(ii) Full name of the Scholar: Kshirod Handique

Topic of research: *An investigation on quasi type II nature of CdSe/ZnSe core/shell nanostructures for possible optoelectronic application.*

Year of PhD degree: 2024

(iii) Full name of the Scholar: Barnali Pathak

Title of the thesis: *Studies of optoelectronic and memristive characterization of some oxide nanoparticles*

Year of PhD degree: 2024

Present occupation: Assistant Prof (Guest), B H College, Howly, Assam

(iv) Full name of the Scholar: Sanatan Kumar Nath

Title of the thesis: *Studies of structural, optical and ionic conductivity in copper sulphide nanostructures*

Year of PhD degree: 2024

Present occupation: Associate Prof, B H College, Howly, Assam

(v)) Full name of the Scholar: Bandana Das

Title of the thesis: *Synthesis and characterization of rare earth metal doped CdSe nanostructures for their possible device application*

Year of PhD degree: 2018

Present occupation: Assistant Prof, Pandu College, Guwahati

(vi) Full name of the Scholar: Sujata Deb

Title of the thesis: *A study on growth and optical properties of ZnO/ZnS core/shell nanocomposites and their application in optoelectronic devices*

Year of PhD degree: 2017

Present occupation: Assistant Prof, Royal Global University, Guwahati

(vii) Full name of the Scholar: Rhituraj Saikia

Title of the thesis: *Growth and characterization of CdSe/CdS core/shell nanostructures for application in solar cell*

Year of PhD degree: 2015

Present occupation: Director, Eudoxia Research Centre, Guwahati

Course/Conference/Workshop organized *(Selected)*

1. International Conference on Advances in Nano-optoelectronics and its Application (ICANOPA-2020) by Department of Physics, Rajiv Gandhi University, Arunachal Pradesh, India

   Duration: 12 October-14 October 2020

   Role: *Convenor*

Course/Conference/Workshop etc. attended *(Selected)*

1. Delivered an invited talk in Workshop, *Frontiers in Basic Physics and Applications* an National Workshop held at Department of Physics, Baranagar College, Barpeta, Assam,. India during 21August-22August,2020.

   Title of the presentation/talk: *Physics of Quantum dots and Core/Shell Nanomaterials*

2. Delivered an invited talk in Workshop on Research Methodology (*WORAM-2020)* an International Workshop held at Eudoxia Research Centre, Guwahati, Assam,. India during 05April-11April, 2020.

   Title of the presentation/talk: *Research Methodology*

3. Delivered an invited talk in International Conference on New Frontiers in Engineering and Science conference (*INFES-2019)* an International Conference held at Eudoxia Research Centre, Guwahati, Assam,. India during 23 February 2019.

   Title of the presentation/talk: *Beauty of Quantum dots*

4. Delivered an invited talk in Himalayan University, a one day Workshop held at Department of Physics, Himalayan University, Itanagar, Arunachal Pradesh, India during 06 February 2019.

   Title of the presentation/talk: *Advances in nanoscience & nanotechnology*

5. Delivered two invited lectures in Workshop *Nano-Electronics and Related discplines* an National Workshop held at Department of Electronics and Communication Technology, Gauhati University, Assam,. India during 01August-06August, 2017.

   Title of the presentation/talk: *(1) Thin films optoelectronics & (2) Core/shell nanostructures*