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Publications (Journal):	1. N. Deka, P. Chakraborty, D. Chandra Patra, S. Dhar, S.P. Mondal, "Self-powered broadband photodetection using PbS decorated ZnO nanorods/reduced graphene oxide junction," Mater. Sci. Semiconductor Process. 118 (2020) 105165. https://doi.org/10.1016/j.mssp.2020.105165 2. N. Deka, P. Chakraborty, D. Chandra Patra, S. Dhar, S.P. Mondal, "Study of self-powered and broadband photosensing properties of CdS/PbS-decorated TiO2 nanorods/reduced graphene oxide junction," Bulletin of Materials Science (2021). https://doi.org/10.1007/s12034-021-02574-4 3. N. Deka, P. Chakraborty, D. Chandra Patra, S.P. Mondal, "Self-powered photosensing and biosensing using hydrothermally grown CdS nanorods," J. Electron. Mater. (2022). https://doi.org/10.1007/s10854-022-08632-9 4. N. Deka, P. Chakraborty, D. Chandra Patra, S.P. Mondal, "Highly Conducting Flake-like CuS Nanostructured Counter Electrode for Photoelectrochemical Solar Energy Conversion," Thin Solid Films (2023). https://doi.org/10.1016/j.tsf.2023.139847 5. P. Chakraborty, N. Deka, D.C. Patra, K. Debnath, S.P. Mondal, "Hydrothermally Grown Porous Cobalt Oxide Nanostructures for Enzyme-Less Glucose Detection," J. Electron. Mater. 50 (2021) 3699–3705. https://doi.org/10.1007/s11664-021-08852-5 6. P. Chakraborty, N. Deka, D.C. Patra, K. Debnath, S.P. Mondal, "Salivary glucose sensing using highly sensitive and selective non-enzymatic porous NiO nanostructured electrodes," Surf. Interfaces 26 (2021) 101324. https://doi.org/10.1016/j.surfin.2021.101324 7. S. Dhar, P. Chakraborty, N. Deka, S.P. Mondal, "Broadband photosensing using p-type cupric oxide nanorods/conducting polymer Schottky junction," Chem. Phys. 529 (2020) 110578. https://doi.org/10.1016/j.chemphys.2019.110578 8. P. Chakraborty, S. Dhar, N. Deka, K. Debnath, S.P. Mondal, "Non-enzymatic salivary glucose detection using porous CuO nanostructures," Sens. Actuators B Chem. 302 (2020) 127134. https://doi.org/10.1016/j.snb.2019.127134 9. D. Chandra Patra, N. Deka, P. Chakraborty, K. Debnath, S.P. Mondal, "Electrochemical nitric oxide detection using gold deposited cobalt oxide nanostructures," Chemical Physics Letters 802 (2022) 139795. https://doi.org/10.1016/j.cplett.2022.139795 10. D. Chandra Patra, N. Deka, Anabadya Dash, S. Khan, T.K. Mishra, S.P. Mondal, "Noninvasive Electrochemical Nitric Oxide Detection in Human Saliva Using Pt and TiO2 Nanoparticle Composite Electrodes," (2023). https://doi.org/10.1021/acsaelm.2c01408 11. D. Chandra Patra, N. Deka, Anabadya Dash, S.P. Mondal, "Gold Nanoparticle-Sensitized Zinc Oxide Nanorods-Based Nitric Oxide Gas Sensors with High Sensitivity, Selectivity and Low Detection Limit," Nano, 2450001. 12. Sagar Bhattarai, N. Deka, Ismail Hossain, Rahul Pandey, "Study the Influence of the double ETLs on the Perovskite solar cell devices to improve the efficiency," Micro and Nanostructures, 2024.

	13. S. Karmakar, S. Sahoo, H.S. Mohanty, R. Boddhula, G. Naaresh Reddy, Sr. R. Mohapatra, K.K. Mahanto, Sk. Anirban, P. Nayak, G.R. Kumar, N. Deka, "Unraveling electrical transport and dielectric relaxation in p2-Type NaMg0.25Mn0.75O2: A promising layered oxide for high temp electronics," Ceramics International, 2025. 14. Souvik Ghosh, Ananda Sharma, Nitumoni Deka, Haraprasad Mondal, Ayush Tara, Ahmet Alali, Jajneswar Nanda, Abhinav Kumar, Ankit Oza, Sagar Bhattarai, Kumar Neupane, "Emerging Frontiers in Perovskite Solar Cells: Principles, Performance, and Pathways to Commercialization," Micro and Nanostructures. 15. Sagar Bhattarai, N. Deka, Ismail Hossain, Rahul Pandey, "Exclusive optimization of Cs2AgBi0.75Sb0.25Br6-based solar cells using dual ETL with better photo transmission," Multiscale and Multidisciplinary Modeling, Experiments and Design. 16. Subrata Karmakar, Mahfuz Ahmed Azmain, G. Anil Kumar, Mahipal Ranot, Nitumoni Deka, Injamamul Hoque Emu, N. Manikanthababu, Ariful Haque, "Investigation of high-temperature electrical transport and current conduction mechanism in PLD deposited LaAlO3/Sn-doped β-Ga2O3 (−201) MOS capacitor," Materials Science in Semiconductor Processing, 2026. https://doi.org/10.1016/j.mssp.2026.110579 17. Subrata Karmakar, Nitumoni Deka, Kotagiri Ganga Prasad, Saikumar Manchala, Biman Kar, Hari Sankar Mohanty, Hitesh Borkar, Surjit Sahoo, Sk Anirban, "Temperature-Dependent Electrical Transport Mechanisms in Ultrawide-Bandgap ZnGa2O4: Overlapping Large-Polaron Tunnelling, Dielectric Relaxation, and Schottky Emission Effects," Journal of Alloys and Compounds, 2026. https://doi.org/10.1016/j.jallcom.2026.187952
Book Chapters:	1. S. Khan, N. Deka, T.K. Misra, "Research trends in multidisciplinary Research," AKNIK Publication, Vol. 20, ISBN: 9789390322930. 2. N. Nandi, N. Deka, S. Khan, "Advances in Renewable Energy Engineering," Vol. 5, Aknik Publication, ISBN: 978-93-5570-175-6. 3. D. Patra, N. Deka, P. Nath, "Ceramic multilayers and films for high performance supercapacitors," John Wiley & Sons, Inc. https://doi.org/10.1002/9781394167166.ch4
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Research Activities (Write about your best research results max of 2-3 pages including diagrams)	Fabricate a self-powered, broadband (UV–visible) photodetector by sensitizing wide-bandgap ZnO nanorods (NRs) with narrow-bandgap PbS nanoparticles, using photo-reduced graphene oxide (RGO) as a transparent top electrode, and evaluate its performance at zero applied bias. Vertically aligned ZnO NRs were grown on FTO-coated glass by hydrothermal synthesis and annealed at 400 °C. PbS nanoparticles were deposited by chemical bath deposition (lead acetate + thiourea, pH ~10, 5 h). Graphene oxide (Hummer's method) was spin-coated on the PbS/ZnO NRs and photo-reduced under UV (15 min) to form the conducting RGO top electrode. Final device: FTO / ZnO NRs / PbS / RGO, active area 0.15 cm², silver-paste contacts. Fig. 1. Schematic of the FTO/ZnO NRs/PbS/RGO self-powered broadband photodetector. Working Principle PbS nanoparticles on the ZnO NR surface extend light absorption from the UV into the visible/near-IR (400–1000 nm), forming a p-PbS/n-ZnO heterojunction. Under illumination, electron–hole pairs generated at the depletion region are separated by the built-in field and swept to the FTO and RGO electrodes without any external bias, giving self-powered photodetection with high external quantum efficiency and fast response. Key Results

	Parameter Value Maximum EQE ~78% Responsivity (Rλ)~0.25 A/W Detectivity (Dλ) ~82,944.55 $Hz^{1/2}$/W at 400 nm Rise / Recovery time ~65 ms / ~74 ms ON/OFF ratio ~715 Rectification ratio~9.5 at −1 V V_{OC} / J_{SC} / PCE 0.27 V / 1.03 mA cm^{-2} / 0.73% The device shows almost linear photocurrent with optical power (5–100 mW/cm^2) and outperforms comparable PbS/ZnO devices in rise/recovery time and detectivity (Table 1 of the paper), while control devices (ZnO NRs/RGO, PbS/RGO) show negligible photoresponse — confirming the PbS/ZnO p-n junction is essential. Conclusion A low-cost, hydrothermally grown PbS-decorated ZnO NR/RGO heterojunction achieves self-powered broadband (350–700 nm) photodetection with ~78% EQE, 0.25 A/W responsivity, ~65/74 ms rise/recovery times, and photovoltaic behaviour (VOC ~0.27 V, PCE ~0.73%), demonstrating strong potential for zero-bias, broadband optoelectronic applications.