Title	DR.	First Name	RAKESH KUMAR	Last Name	SAHOO	Photograph

Designation	Assistant Professor
Department	Physics
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Education

Subject	*Institution*	*Year*	*Details/ specializations*
B.Sc.	N.C. College, Jajpur/ Utkal University	2003	Physics (H)
M.Sc.	Utkal University	2005	Condensed Matter Physics
M.Tech.	N.I.T. Rourkela	2008	Materials Engineering (Certificate of merit)
Ph.D.	I.I.T. Kharagpur, West Bengal	2009 2013	Carbon nanomaterials

Career Profile

Organization/ Institution	*Designation*	*Duration*	*Role*
CSIR-IMMT, Bhubaneswar, India	Quick Hire Scientist	18/08/2013 18/08/2016	Independent research
CSIR-IMMT, Bhubaneswar, India	Project Scientist	20/10/2016 31/03/2016	Independent research
Pusan National University, South Korea	Post-doctoral Researcher	16/10/2017 31/10/2019	Independent research
Institute of Physics, Bhubaneswar, India	Post-doctoral Researcher	14/12/2020 14/12/2022	Independent research
Govt. Women's College, Sambalpur, India	Assistant Professor in Physics	23/02/2023 Till date	Teaching & Research

Research/ Interests/ Specialization

- ***Functional materials design for energy & environment applications***: **Supercapacitor, Battery, Solar cells, Sensor, Photo/Electro-catalysis, etc.**
- Waste management
- Surface and interface study of gem stones and smart coatings
- Processing of natural and advance ceramics
- Gems and gemology
- Atomic Force Microscopy
- Electronic Materials
- Nanotechnology
- Transparent conducting oxides

Teaching Experience (Subjects/ Courses Taught)

1. Scanning Probe Microscopy (B.Tech., M.Tech., M.Sc. and Ph.D.)
2. Characterizations of Materials (M.Sc. and Ph.D.)
3. Electrodynamics (M.Sc.)
4. Quantum Mechanics (B.Sc.)

5. Electricity and Magnetism (B.Sc.)
6. Mechanics (B.Sc.)
7. Solid State Physics (B.Sc., M.Sc.)
8. Condensed Mater Physics-I & II (M.Sc., specialization papers)

Honors & Awards

1. **Certificate of merit** in M.Tech. from NIT Rourkela, Odisha, India.
2. **Institute Fellowship,** Indian Institute of Technology, Kharagpur, India, 2009-2013.
3. **Third prize winner** in Oral presentation in institute research scholar day at IIT Kharagpur, India.
4. Global Frontier Hybrid and Interface Materials Postdoctoral Fellowship, South Korea
5. DAE Institute Post-doctoral Fellowship at Institute of Physics Bhubaneswar

Publications: Patent filed/ granted

1. "Treatment method of natural gem stones for enhancing color and clarity, involves extending plasma arc by movement of electrodes with prescribed amount of current and load voltage to treat charge mixture to get desire color of gem stones", Rakesh K. Sahoo, Birendra K. Mohapatra, Saroj K. Singh and Barada K. Mishra, Patent Number(s): IN201503012-I1, Patent Assignee: Council Sci. & Ind. Res. India.

Publications: Articles in international and national peered reviewed journals

- ***32*** *peer reviewed journal,* ***1*** *patent and* ***2*** *book chapter publication as* ***first/ corresponding author***
- ***7*** *peer reviewed journal publication as* ***leading second author***
- ***3*** *peer reviewed journal publication as* ***co-author***

1. Exploring superparamagnetic and intercalated Ag quantum particles in manganese oxide/graphene oxide for rapid and scalable organic pollutant removal, Rakesh K Sahoo, Pushpendra Gupta, Prasanna Panda, Ashutosh Rath, Bankim Tripathy, Parveen Garg, Subhankar Bedanta, Uday Despande, Shikha Varma, *Emergent Materials*, (2024), 1-16.
2. Room temperature synthesis of structure–morphology tuned copper-doped ZnO nanorods and their photo-physics, Sachindra Nath Sarangi, Rakesh K Sahoo, Ashis K Manna, P Dash, Santosh K Choudhury, Shikha Varma, *Journal of Materials Science: Materials in Electronics*, 34(2023)1-24.
3. Bifunctional Microwave-assisted Molybdenum-complex Carbon Sponge Production for Supercapacitor and Water-splitting Applications, Rakesh K. Sahoo, Je Moon Yun and Kwang Ho Kim, *ACS Appl. Mater. Interfaces* 2021, 13, 51, 60966–60977.
4. Facile Synthesis of Super-paramagnetic Au @α-Fe_2O_3 Hybrid Nanoparticle and its Assembly on Graphene Substrate for Visible Light Photo-catalysis, Rakesh K. Sahoo, Ashis K. Manna, Arya Das, Arijit Mitra, Mamata Mohapatra, Sachindra Nath Sarangi, Parveen Garg, Uday Deshpande, Shikha Varma, *Applied Surface Science* ,2022, 577,151954
5. "Scalable processing method using waste polystyrene to produce nitrogen-enriched porous carbon for boosting supercapacitor performance" Rakesh K. Sahoo , Ramesh Kumar Chitumalla, Arya Das, Mamata Mohapatra, Je Moon Yun, Joonkyung Jang, Kwang Ho Kim, Saroj K. Singh, *Materials Letters*, 300 (2021) 130135.
6. Facile Synthesis of Nickel Oxalate@Carbon as Electrical Double Layer and its Derived Nickel Oxide as Pseudo Type Supercapacitor Electrodes, Kishor Kumar Sahu, Rakesh K. Sahoo, L D Beshra, Mamata Mohapatra, Ionics 27, (2021) 819-832.

7. “Improvement of electrical performance by surface structure of Ni-material as a high-performance asymmetric supercapacitor electrode”, Damin Lee, Nanasaheb M. Shinde, Ji Cheng Ding, Jianjian Fu, Rakesh K.Sahoo, Hyun Woo Lee, Je Moon Yun, Heon-Cheol Shin, Kwang Ho Kim, *Ceramics International*, 46, 2020, 11189-11197.
8. “Asymmetric Faradaic Assembly of Bi_2O_3 and MnO_2 for High Performance Hybrid Electrochemical Energy Storage Device”, Saurabh Singh, Rakesh K. Sahoo, Je Moon Yun, Kwang Ho Kim, *RSC Advances* 9 (2019), 32154-32164.
9. “Sb_2S_3 Nanoparticles Anchored or Encapsulated by Sulfur-Doped Carbon Sheet for High-Performance Supercapacitor", Rakesh K. Sahoo, Saurabh Singh, Je Moon Yun, Kwang Ho Kim, *ACS Applied Materials & Interfaces* 11 (2019), 33966-33977.
10. “Facile Synthesis of Bi_2O_3@MnO_2 Supecapatterey-type Electrode for Synergetic Energy Storage Applications”, Saurabh Singh, Rakesh K. Sahoo, Nanasaheb M. Shinde, Je Moon Yun, Rajaram S. Mane and Kwang Ho Kim, *energies*, 12(17), (2019) 3320.
11. “Synthesis of the 3D Porous Carbon-Manganese Oxide (3D-C@MnO) Nanocomposite and its Supercapacitor Behavior Study”, Rakesh K. Sahoo, Araya Das, Saurabh Singh, Damin Lee, Saroj K. Singh, Je Moon Yun, Rajaram S. Mane and Kwang Ho Kim, *Progress in Natural Science: Materials International*, 29 (2019) 410-415.
12. “Two-step Plasma Mediated Synthesis of Mullite and Sillimanite Powder and their Suspensive Spray Coating on Stainless Steel”, Ayashkant Mekap[1], Rakesh K. Sahoo[1], Arya Das, Debidutta Debasish, Shubhra Bajpai and Saroj Kumar Singh, *Surface Coating Technology*, 372 (2019) 103-110.
13. "Electrochemical glucose sensing characteristics of two-dimensional faceted and non-faceted CuO nanoribbons” Rakesh K. Sahoo, Arya Das, Koyel Samantaray, Saroj K. Singh, Rajaram S. Mane, Heon-Cheol Shin, Je Moon Yun and Kwang Ho Kim, *CrystEngComm*, 21 (2019) 1607–1616.
14. “Ultra-rapid chemical synthesis of mesoporous Bi_2O_3 micro-sponge-balls for supercapattery applications”, Nanasaheb Shinde, Qi Xia, Je M Yun, Pritam Shinde, Shoyeb Shaikh, Rakesh K. Sahoo, Rajaram S. Mane, Sanjay Mathur, Kwang Kim, *Electrochimica Acta*, 296 (2019) 308-316.
15. "Thermal plasma-inspired synthesis of $ZnO_{1-X}Mn_x$ dilute magnetic semiconductors for enhanced visiblelight photocatalysis”, Arya Das, Rakesh K. Sahoo*, Dilip Kumar Mishra, Saroj K. Singh, R. S. Mane, Kwang Ho Kim, *Applied Surface Scienc*e, 467-468 (2019) 1059-1069.
16. "Cobalt diffusion of natural quartz for aesthetic enhancement and value addition" Rakesh K. Sahoo*, Biswa Bhusan Dhal, Saroj K. Singh and Barada K. Mishra, *International Journal of Nano and Biomaterials* 7 (3) (2018), 231 - 241.
17. "Synthesis of magnesium oxide nanopowder via plasma processing route", Sanghamitra Dash, Rakesh K. Sahoo*, Saroj K. Singh, and Dinesh Singh, *Int. J. of Nano and Biomat*erials 7 (3), 210 - 218.
18. "Effect of annealing temperature on super-capacitive behavior of hydrothermally synthesized ZnO nano-platelets", Arya Das, Rakesh K. Sahoo*, Saroj K. Singh and Barada K. Mishra, *Int. J. of Nano and Biomaterials*, 7 (3) (2018)176 - 182.
19. “Synthesis of $MgAl_2O_4$ spinel by thermal plasma and its synergetic structural study”, Sanghamitra Dash, Rakesh K. Sahoo*, Shubhra Bajpai, Arya Das, Debidutta Debasish and Saroj K. Singh, *Journal of Alloy and Compounds*, 726 (2017) 1186-1194.
20. "Synergetic surface and chemical durability study of the aesthetically enhanced natural quartz by heat treatment", Rakesh K. Sahoo*, Prajna P. Rout, Saroj K. Singh, Barada K. Mishra and Birendra K. Mohapatra, *Metallurgical and Materials Transaction A*, 48 (2017), 1111-1120.
21. "Spectroscopic investigation and colour change of natural topaz exposed to PbO and CrO3 vapour", Prajna P. Rout, Rakesh K. Sahoo*, Saroj K. Singh, Barada K. Mishra, *Vibrational Spectroscopy* 88 (2017) 1-8.
22. “Conducting Polymer PEDOT: PSS: An Emerging Material for Flexible and Transparent Electronics”, Anupama Chanda, S. R. Joshi, Rakesh K. Sahoo, S. Varma, Kwangsoo No, *Sensors & Transducers*, 210 (2017), 29-31.

23. "Grading of Manganese oxide ore from Bonai-Keonjhar belt, Odisha through vibrational spectroscopy technique", S. Pani, R. K. Sahoo, S.K. Singh and B. K. Mohapatra*, *Advanced Science Letter*, 22 (2016) 419-423.
24. "Surface and bulk 3D analysis of natural and processed ruby using electron probe micro analyzer and X-ray micro CT scan ", Rakesh K. Sahoo*, Saroj K. Singh and Barada K. Mishra, *Journal of Electron Spectroscopy and Related Phenomena* 211 (2016) 55–63.
25. "Aesthetic Value Addition and Surface Study of Odisha Ruby Stones by Heat Treatment with Different Metal Oxide Additives", R.K. Sahoo, B.K. Mohapatra, S.K. Singh, B.K. Mishra, *Advanced Science Letters* 22 (2) (2016), 336-340.
26. "Effect of ion concentration on supercapacitive behavior of ZnO nanoplatelets", Arya Das, Rakesh K. Sahoo and Saroj K. Singh*, *Advanced Materials Letter* 1 (2016), 93-95.
27. "N and Cr ion implantation of natural ruby surfaces and their characterization" K. Sudheendra Rao, Rakesh K. Sahoo, Tapan Dash, P. Magudapathy, B.K. Panigrahi, B.B. Nayak, *Nuclear Instruments and Methods in Physics Research Section B: Beam Interactions with Materials and Atoms*, 373, (2016), 70-75.
28. "Synthesis of superhydrophobic SiC thin-film on stainless steel surface by thermal plasma evaporation method", Rakesh K. Sahoo*, Arya Das, Saroj K. Singh and B.K. Mishra *Surface & Coatings Technology* 307PA (2016) 476-483.
29. "A combination of "Top-down" and "Bottom-up" approaches in the fabrication of "Nano Bridges"" R.K. Sahoo, Damodar. D and C. Jacob*, *Journal of Materials Science: Materials in electronics*, 26(2015) 435-440.
30. "Aesthetic value improvement of the ruby stone using heat treatment and its synergetic surface study", Rakesh K. Sahoo, Birendra K. Mohapatra*, Saroj K. Singh and Barada K. Mishra, *Applied Surface Science*, 329 (2015) 23-31.
31. "Cost effective and minimal time synthesis of mullite from shale, a rock associated with iron/manganese ore by thermal plasma", S. Pani, R. K. Sahoo, N. Dash, S.K. Singh and B. K. Mohapatra, *Advanced Materials Letter*, 6 (2015) 316-324.
32. "Synthesis of low carbon boron carbide powder using a minimal time processing route: Thermal plasma", Avinna Mishra, Rakesh K Sahoo*, B.K. Mishra and S.K. Singh, *Journal of Asian Ceramic Society* 3(2015) 373-376.
33. "The effect of growth temperature variation on partially bismuth filled carbon nanotubes synthesis using a soft semi-metallic template", R.K. Sahoo and C. Jacob*, *Journal of Nanoscience and Nanotechnology* 14(2014) 4595-4601(7).
34. "Iridium catalyzed growth of vertically aligned CNTs by APCVD" R. K. Sahoo and C. Jacob*, *Materials Science and Engineering B*, 185 (2014) 99-104.
35. "Influence of functional derivatives of an amino-coumarin/MWCNT composite organic hetero-junction on the photovoltaic characteristics**",** R. K. Sahoo, S. Atta, N D Pradeep Singh and C. Jacob*, *Materials Science Semiconductor Processing* 25 (2014) 279-285.
36. "Influence of hydrogen on the chemical vapor synthesis of different carbon nanostructures using propane as precursor and nickel as catalyst", R.K. Sahoo, H. Mamgain and C. Jacob*, *Bulletin of Materials Science*, 37 (2014) 1197-1204.
37. "Influence of temperature on surface coloration of the lead oxide treated natural gem ruby", Rakesh K. Sahoo, Birendra K. Mohapatra*, Saroj K. Singh and Barada K. Mishra, *Advanced Science Letter* 20(2014) 622-625.
38. "Single-step synthesis of graphene-carbon nano fibre hybrid material and its synergistic magnetic behavior", R.K. Sahoo, P. Jeyapandiarajan, K Devi Chandrasekhar, B.S.S. Daniel, A. Venimadhav, S.B. Sant and C. Jacob*, *Journal of Alloy and Compounds*, 615 (2014) 348-354.
39. "Catalyst free growth of CNTs on nanoscale rough surface of silicon substrate", D. Damodar, R. K. Sahoo, C. Jacob*, *AIP Conference pro*ceeding 1536, (2013) 535-537.
40. "Multiwall and bamboo-like carbon nanotube growth by CVD using a semimetal as a catalyst," R.K. Sahoo, V. Daramalla, C. Jacob*, *Materials Science and Engineering B* 177 (2012) 79– 85.

41. "Effect of annealing on the structural, topographical and optical properties of sol-gel derived ZnO and AZO thin-films", Joydip Sengupta*, R.K. Sahoo, K.K. Bardhan, C.D. Mukherjee, *Materials Letters* 83(2012) 84-87.
42. "Influence of annealing temperature on the structural, topographical and optical properties of sol-gel derived ZnO thin films", Joydip Sengupta*, R.K. Sahoo, K.K. Bardhan, C.D. Mukherjee, *Materials Letters* 65 (2011) 2572–2574.

Publications: Articles / Book Chapter

1.	Chapter-16: **Role of Nano-Biotechnology in Solid Waste Management**, Rakesh K. Sahoo, Shikha Varma, Saroj Kumar Singh, Book title: **Bioremediation**, Pages 157-171,	CRC Press,	2022	ISBN97810031 81224.
2.	Chapter:18 **"Nanomaterials in biosensors for medical applications"** by Rakesh K. Sahoo, Saroj Kumar Singh, Rajaram S. Mane, Shikha Varma, Book Entitled: **"Nanomaterials for Sustainable Development in Biosciences-Opportunities and Future Perspectives"**	Springer	2023	ISBN: 978-981-99-1635-1

Conference/ Presentations

1. Silparani Swain, Rakesh K. Sahoo*, Modified Graphene @ Molybdenum Disulfide 2D Layered Hybrid Nano-composite in Supercapacitor, Recent Development of Frontier in Physics (RDFP-2024), Organized By: Department of Physics, 15th -16th December 2024.
2. Sandhyarani Lenka, Rakesh K. Sahoo*, Topological Insulator as a Pseudo-capacitor: Exploring Novel Energy Storage Mechanism, Recent Development of Frontier in Physics (RDFP-2024) Organized By: Department of Physics, 15th -16th December 2024.
3. Sabita Naik, Rakesh K. Sahoo*, Developments in Organic/Inorganic Hybrid Nanorods for Blue Light Emitting Diode, Recent Development of Frontier in Physics (RDFP-2024), Organized By: Department of Physics, 15th -16th December 2024.
4. Pujaprajna Sahoo, Rakesh K. Sahoo*, Carbon Nanotube (CNT) as a Nano wonder for Transistor Based Detection of Biomolecules: Prospective and Challenges, Recent Development of Frontier in Physics (RDFP-2024) Organized By: Department of Physics, 15th -16th December 2024.
5. Jyoti Rani Panda, Rakesh K. Sahoo*, III-V Core-shell Nanowire in High Efficiency Photovoltaic: Perspectives, Challenges & Future Scopes, Recent Development of Frontier in Physics (RDFP-2024) Organized By: Department of Physics, 15th -16th December 2024.
6. J.M. Subhalaxmi Biswal, Rakesh K. Sahoo*, Carbon Quantum dots in bio-imaging and bio-sensing: A prospective review, Recent Development of Frontier in Physics (RDFP-2024), Organized By: Department of Physics, 15th -16th December 2024.
7. A Scalable and Short Processing time Route to Process Waste Polystyrene to an Efficient Electrochemical Storage Material, Rakesh K. Sahoo, International Webinar on Functional Energy Materials, Organized by Clemson Nanomaterials Institute, Clemson University, USA 18th to 19th November 2020
8. Synthesis of the porous carbon-manganese oxide composite for supercapacitor application, Rakesh K. Sahoo, Araya Das, Saurabh Singh, Damin Lee, Saroj K. Singh, Je Moon Yun, Rajaram S. Mane and Kwang Ho Kim, IUMRS-ICEM 2018,19 – 24th August 2018, Daejeon, South Korea, organized by organized the Materials Research Society of Korea and the International Union of Materials Research Societies.
9. R.K. Sahoo, C. Jacob, S. B. Sant, P. Jeyapandiarajan and B.S.S. Daniel, Formation of hybrid graphene-carbon nano fiber structure using a polymer encapsulated multi elemental catalyst by CVD, Molecular Materials Meeting (M3) @ Singapore 2012 from 8th to 12 Jan 2012

10. Silicon carbide superhydrophobic coating on stainless steel surface by thermal plasma evaporation method, Rakesh K. Sahoo, Arya Das, Saroj K. Singh and Barada K. Mishra, International conference on functional materials (ICFM-2016) during 12-14th December, Organized by I.I.T Kharagpur, West Bengal, India
11. Effect Of Annealing Temperature On Super capacitive Behavior Of Hydrothermally Synthesized ZnO Nano-platelets, Arya Das, Rakesh K. Sahoo* and Saroj K. Singh, International Conference on Smart Materials and Applications (ISMA 2016) during 15-17 December, 2016 Organized by S"O"A University, Bhubaneswar, Odisa, India**.**
12. Aesthetic enhancement of the low quality waste gem stones to a high value product by modified thermal diffusion, Rakesh K. Sahoo, Saroj K. Singh and Barada K. Mishra, IISF-2015, Organized by I.I.T Delhi.
13. Saroj K. Singh, Rakesh K. Sahoo and Arya Das, First International Conference on Advanced Materials for Power Engineering (ICAMPE-2015) 11-13 December 2015 at Mahatma Gandhi University, Kottayam, Kerala, India
14. Rakesh K. Sahoo, Birendra K. Mohapatra, Saroj K. Singh and Barada K. Mishra, Aesthetic value addition and surface study of Odisha ruby stones by heat treatment with different metal oxide additives, STDH-2014, SOA University. Thermal Plasma approach to fabricate functional hybrid materials.
15. R.K. Sahoo, Birendra K. Mohapatra, Saroj K. Singh and Barada K. Mishra, Influence of temperature on surface colouration of the lead oxide treated natural gem ruby, RTCMP-2014, Organized by Odisha Physical Society, SOA University from 8th-9th February 2014.
16. R.K. Sahoo, Birendra K. Mohapatra, Saroj K. Singh and Barada K. Mishra, "Surface study of typical ruby stones from a part of Odisha for aesthetic value addition, ICEMP 2014, Organized by Institute of Minerals and Materials Technology, Bhubaneswar from 26th -28th February 2014.
17. R.K. Sahoo, Damodar D, C. Jacob, Growth of grapheme-CNT hybrid nanomaterial using boron carbide as a catalyst, Organized by Materials Science Centre, Indian Institute of Technology Kharagpur from 5th -7th February 2014.
18. R. K. Sahoo, Damodar D and C. Jacob, Semiconducting nano particles in the catalysis of one–dimensional carbon nano structures, ISJPS-2013, Organized by Department Physics and Meteorology, Indian Institute of Technology Kharagpur from 25th -28th February 2013.
19. D. Damodar, R. K. Sahoo, C. Jacob, Catalyst free growth of CNTs on nanoscale rough surface of silicon substrate, RAM–2013, GCE, Bikaner 1st – 2nd February 2013.
20. R. K. Sahoo and C. Jacob, Growth of carbon nanotubes using a multi-metal catalyst, ISME- 2011 at Pune from 23-28 March
21. R.K. Sahoo, C. Jacob, S. Sant, P. Jeyapandiarajan, B.S.S. Daniel and J. Mohapatra, One-step growth of graphene–carbon nanofiber hybrid materials by atmospheric chemical vapor deposition, ICAMMP-2011, Organized by Department of Metallurgical and Materials Engineering, Indian Institute of Technology Kharagpur from 9th -11th December 2011
22. R.K.Sahoo, V. Daramalla and C. Jacob, Multiwall carbon nanotube growth by CVD using bismuth as a catalyst, NANO-2010, K S R Group of Institutions, KSR Kalvi NagarTiruchengode-637215, Namakkal (Dt.), Tamil Nadu, India
23. C. Yadala, R. K.Sahoo and C. Jacob, A comparative study of the synthesis of copper oxide nanostructures using different deposition methods, ICFANT 2010, Jadavpur University Kolkota , India from 9th – 11th December 2010

Public Service/ University Service/ Consulting Activity/ College Committee members

1. Head of the Department of Physics
2. O.I.C. All India Survey on Higher Education (AISHE)
3. O.I.C. DSA
4. Member of College Examination Cell
5. Member of Scholarship & Stipend committee
6. Member of Time Table committee
7. Member of Advisor, College Union

8. Member of Anti- Sexual Harassment Cell
9. Member of Library Committee
10. Member of Physically Challenged Cell
11. Member of Discipline Committee

Professional Societies Memberships

1. Life member Odisha Physical Society
2. Reviewer for Surface Coating Technology (Elsevier)
3. Reviewer for Applied Surface Science
4. Reviewer for Journal of Engineering Building Materials
5. Reviewers for RSC Advance

Projects(Major Grants/ Collaborations)

- MUKHYAMANTRI RESEARCH INNOVATION (MRI) Research funding from Higher Education Department, Government of Odisha of Rs 995,000/-

Other Details

Seminars, Conferences, Symposia Workshops, FDP etc., attended

Seminar/ Conference/ Workshop etc.	**Name of the Sponsoring Agency**	**Place and Date**
1. Summer course in Organic Electronic	IIT Kanpur	IIT Kanpur, 5th to 10th July, 2010
2. Introduction to Confocal Raman and Scanning Probe Microscopy WITec Confocal RAMAN Workshop	Toshniwal Brothers (SR) Pvt. Ltd.	19th. October 2010, Bangalore, India