

Bio Data



1. **Name:** Dr. Chandra Sekhar Rout

2. **Address:** Professor, Centre for Nano & Material Sciences, Jain University, Jakkasandra Post, Kanakapura Taluk, Ramanagara District-562112, Karnataka, INDIA

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3. **Gender:** Male

4. **Date of Birth:** 08/07/1981

5. **E-mail ID:** csrout@gmail.com; r.chandrasekhar@jainuniversity.ac.in

6. **Qualification:**

S. No.	Degree	Institution	Year	Division/Class
1	Ph.D.	JNCASR, Bangalore	2008	NA
2	M.Sc. (Physics)	Utkal University	2003	1 st class
3	B.Sc. (Physics)	Utkal University	2001	1 st class

Discipline: Physics (Applied Physics)

Area of specialization: Functional materials for energy storage, Supercapacitors, Microsupercapacitors, Flexible supercapacitors, 2D materials

Title of the PhD Thesis: Gas-sensing and electrical properties of metal oxide nanostructures

Thesis Supervisor: Professor C.N.R. Rao, FRS.

6. Employment Experience

S. No.	Position & Organization	Nature of Job	Period
1.	Professor, Jain University	Research, Teaching and other Academic work	May 2021 - continue
2.	Associate Professor, Jain University	Research, Teaching and other Academic work	August 2017 –April 2021
3.	DST Ramanujan Fellow, IIT Bhubaneswar	Research, Teaching and other Academic work	Feb 2013 to July 2017
4.	Post-Doctoral Fellow, Ulsan National Institute of Science and Technology, South Korea	Research	Jan 2012 to Dec 2012
5.	Post-doctoral researcher at Purdue University, USA.	Research	Jan 2010 – Dec 2011
6.	Post-doctoral researcher at National University of Singapore	Research	Oct 2008 – Dec 2009

7. Publications: - >250 publications in International journals

8. Patents filed/Granted with details: 03

9. Books Published: 07

(i) Fundamentals and sensing applications of 2D materials: Edited by **C.S. Rout**, Hywel Morgan and D.J. Late, 2019, **Elsevier (Woodhead publishing)**, ISBN: 9780081025789

(ii) Gas sensing and electrical properties of metal oxide nanostructures, **C.S. Rout**, *LAP Lambert Academic Publications*, Germany, 2010, 978-3-8383-6358-5

(iii) Fundamentals and supercapacitor applications of 2D materials, Edited by **C.S. Rout** and D.J. Late (Elsevier), 2021, **ISBN:** 9780128219935

(iv) 2D metallic transition metal dichalcogenides, Edited by **C.S. Rout** and B. Chakraborty (Nova Science Publishers), 2022, **ISBN:** 978-1-68507-965-9

(v) Advanced analytical techniques for characterization of 2D materials, Edited by **C.S. Rout** and Dattatray Late (American Institute Publishers), 2022, **ISBN:** 978-0-7354-2542-2.

(vi) 2D Materials-Based Electrochemical Sensors, Edited by **C.S. Rout** (Elsevier), 2023, **ISBN:** 9780443152948

(vii) Engineered 2D Materials for Electrocatalysis Applications, Edited by **C.S. Rout** (IOP Publishing), 2024, **ISBN:** 978-0-7503-5719-7

Prof. C.S. Rout is the group leader of the laboratory on Functional materials and devices in Centre for Nano and Material Science, Jain University. Since last decade he has been working on 2D materials synthesis, characterization and its application in energy storage devices, supercapacitors and microsupercapacitors, Field emitters, chemical-biosensors and other device applications (*ACS Appl. Mater. Interfaces*, **2013**, **5**, **11427**; *Nanoscale* **2015**, **7**, **13293**; *ACS Appl. Mater. Interf.* **2017**, **9**, **9640**; *J. Mater. Chem. A* **2015**, **3**, **18874**; *ACS Appl. Mater and Interf.* **2017**, **9**, **23894**; *Sci. Reports (Nature)*, **2013**, **3**, **3282**; *J. Am. Chem. Soc.* **2013**, **135**, **8720**; *J. Mater. Chem. A* **2022**, **10**, **23590**). After an excellent research training under the supervision of Prof. C. N. R. Rao, FRS, at the Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore (2003-2008), Dr. Rout moved to National University of Singapore (2008-2009), then to Purdue University, USA (2009-2011) and Ulsan National Institute of Science and Technology, South Korea (2011-2012) for postdoctoral research. He carried out some original work in the area of fabrication of sensors and energy storage devices based on graphene and other nanomaterials during his postdoctoral work.

He was awarded prestigious **Ramanujan Fellowship (2013)** and Young Research Scientist career award (2014) from Science and

Engineering Research Board (Government of India). He started his independent research career at IIT Bhubaneswar as a DST Ramanujan fellow (2013-2017) and has contributed significantly in the field of 2D materials research. He serves as an active member of different national and international research societies and is associate editor of several high profile international journals. **He was listed as top 2% scientist from world by Stanford University (USA) in Applied Physics in 2020, 2021 and 2022.** Presently, he is working as a full Professor at Centre for Nano and Material Sciences, Jain University, Bangalore His main research work is focused on fabrication of different 2D nanomaterials such as graphene, transition metal dichalcogenides and MXenes etc. for variety of devices such as sensor, transistor, photo detector, energy storage devices and supercapacitors etc.

He has enormously contributed in the field Physics of nanoscale gas sensor devices based on 2D Materials at room temperature. His research work focused on the "Development of 2D materials for Nano/optoelectronics devices, energy generation and storage applications". He is leading expert in India who has contributed significantly on energy related applications of graphene analogous 2D layered materials. Dr. Rout has published more than 200 research papers in prestigious peer reviewed journals with > 10,500 citations and with current h-index 51 and i-10 index 148. He has edited five books, filed four patents and also a member of various scientific societies across the globe. He is also board member of various international journals and **Associate Editor of RSC Advances (UK) and MDPI journals.** He has completed several major research projects funded by various funding agencies with total cost of the projects > Rs. 600 Lakhs. He has supervised /co-supervised five PhD, students, five postdoctoral researchers and twenty master theses. Presently, more than five students are working under his guidance for their PhD degree. He has delivered more than 100 invited talks in various national and international conferences. He was also worked as a convener for organizing the National and International conference held in India and abroad.

10. Sponsored Research Projects

Title of the project	Funding Agency	Lead coordinator and Duration	Significant outcomes

	& Total cost		
Two dimensional NiCo ₂ O ₄ -graphene composites for high performance high supercapacitor electrodes	BRNS-DAE Rs. 24.46 Lakhs	Dr. C.S. Rout (2014-2017)	The supercapacitors fabricated using NiCo ₂ O ₄ showed specific capacitance of ~823 Fg ⁻¹ at a current density of 0.823 Ag ⁻¹
Flexible and free-standing vanadium sulfides/ reduced graphene oxide paper for high performance supercapacitor electrodes	DST Rs. 11.41 Lakhs	Dr. C.S. Rout (2014-2017)	VS ₄ /reduced graphene oxide, which showed an enhanced specific capacitance of ~877 F/g at a current density of 0.5 A/g.
Chemical and Biosensors based on two dimensional layered structures and their graphene based hybrids	UGC-UKIERI Rs. 22.72 Lakhs	Dr. C.S. Rout (2014-2016)	We published a joint review article in "Nanoscale, 2015, 7 , 13293-13312" on recent developments of 2D materials in various sensing applications like chemical and gas sensors, electrochemical sensors and biosensors, SERS sensors and photodetectors.
Resistive memory devices based on semiconductor nanostructures and graphene	SERB-DST Rs. 85.00 Lakhs	Dr. C.S. Rout (2014-2018)	Resistive memory devices and other electronic devices have been fabricated.
Heterojunction white light emitting diodes based on metal oxides and their graphene oxide based hybrids	SERB-DST Rs. 17.04 Lakhs	Dr. C.S. Rout (2014-2017)	Two-dimensional metal oxide nanosheets have been prepared by facile and cost-effective one-step electrodeposition method.

Center of Excellence for Novel Energy Materials	MHRD Rs. 300.00 Lakhs	Prof. Saroj K Nayak (2014-2019)	Novel materials prepared exhibits a high specific capacitance of 2421 F/g at a current density of 1 A/g, and excellent cyclic performance, suggesting it an efficient electrode for next generation supercapacitors.
Joint centre on "Nanostructure Genomics: Designing Functionality of 2-Dimensional Nanostructures and Nano-Bio Interfaces"	IUSSTF Rs. 67.44 Lakhs	Prof. Saroj K Nayak (2015-2018)	Biosensors based on 2D materials and graphene hybrids have been investigated.
High performance microsupercapacitors based on vertically standing NiCo ₂ S ₄ /graphene arrays with insight from Raman spectroscopy & DFT investigations	SERB-DST Rs. 43.00 Lakhs	Dr. C.S. Rout (2018-2021)	Vertically aligned NiCo ₂ S ₄ /graphene arrays are investigated for high performance supercapacitor applications
Defect engineering of 2D transition metal carbide-graphene heterostructures for high performance hybrid electronic devices	DST (India-Austria collaboration grant), Rs. 9.4 Lakhs	Dr. C.S. Rout (2019-2021)	2D transition metal carbide-graphene heterostructures for energy conversion and storage applications are investigated.
MXenes derived Two dimensional C-TiO ₂ -Ag nanocomposites for antimicrobial self-cleaning and	DST, Rs. 50.0 Lakhs	Dr. C.S. Rout (2019-2022)	Ongoing project

conservation of heritage objects			
Energy storage devices based on 2D MXene and layered transition metal chalcogenides hybrids	VGST, Govt. of Karnataka, Rs. 5.0 Lakhs	Dr. C.S. Rout (2019-2020)	Energy storage applications of various 2D layered materials and their MXene based hybrids are investigated.
Self-charged energy storage devices based on defect engineered advanced heterojunction materials	DST-Nanomis sion, Rs. 44.38 Lakhs	Dr. C.S. Rout (2019-2022)	MXene based hybrids for supercapacitors
Soil nitrate and environmental NOx gas monitoring by advanced MXene based hybrid materials	SERB-DST Rs. 49.00 Lakhs	Dr. C.S. Rout (2023-2025)	Chemical and gas sensors based on MXene and their hybrid materials

11. Teaching Experience:

S.N.	Subject taught	UG/ PG/ PhD	Year & Institution
1.	Physics-I: Oscillations, Waves and Electromagnetic waves	UG	I.I.T. Bhubaneswar, 2012-2017
2.	Quantum Mechanics I	UG	I.I.T. Bhubaneswar, 2012-2017
3.	Laboratory	UG	I.I.T. Bhubaneswar, 2012-2017
4.	Electronics	PG	I.I.T. Bhubaneswar, 2012-2017
5.	Laboratory	PG	I.I.T. Bhubaneswar,

			2012-2017
6.	Quantum Mechanics	PG	CNMS, Jain University, 2017-cont
7.	Nuclear Physics	PG	CNMS, Jain University, 2017-cont
8.	Mathematical Methods	PG	CNMS, Jain University, 2017-cont
9.	Nanoscience & Nanotechnology	PhD	CNMS, Jain University, 2017-cont
10.	Device and Applied Physics	PhD	CNMS, Jain University, 2017-cont
11.	Spectroscopy I	PG	CNMS, Jain University, 2017-cont

Teaching interests: Semiconductor Physics and Devices, Solid State Physics, Fundamentals of Nanoscience and Nanotechnology, Basics of Quantum mechanics, Experimental Methods in Materials Science and Engineering, Carbon based Materials and Devices, 2 Dimensional Materials and applications, Renewable energy sources and devices, Electronics

12. Thesis (Masters/PhD level) & Postdoc supervision

S.N	Name of the Student	Masters /PhD/ Postdoc	Title of Thesis/Research	Year
1.	Dr. Karthick Kannan P	Postdoc	Non-enzymatic Biosensors based on 2D materials	2014-2016
2.	Dr. Sanjay Mondal	Postdoc	Flexible Supercapacitor devices based on graphene analogue materials	2016
3.	Dr. Rajeswari P	Postdoc	Flexible Biosensor devices based on ZnO-graphene composites	2016-2018
4.	Dr. Mukulika Dinara	Postdoc	Supercapacitors based on 2D materials	2017-2019
5.	Mr. Kusha Kumar Naik	PhD	Multi-functional Nanosheet Arrays for field emission and	Comple

			biosensing applications	te (2013- 2019)
6.	Mr. Satyajit Ratha	PhD	Supercapacitors based on 2D materials and hybrids	2024
7.	Mr. Surjit Sahoo	PhD- discontin ued	Flexible Supercapacitors based on spinel oxides and chalcogenides	2014- 2016
8.	Ms. Rutuparna Samal	PhD- cont.	Engineered functional materials for Supercapacitor applications	Comple te (2021)
9.	Ms. Mansi Pathak	PhD- cont.	Ternary spinel based materials for supercapacitor applications	Comple te (2024)
10.	Mr. Sree Raj	PhD- cont.	Metallic 2D materials for energy storage applications	Comple te (2024)
11.	Mr. Suresh Kumar	MSc.	2D layered material for biosensing applications	2015
12.	Mr. Krishnakanta Singha	MSc.	3D mesoporous NiCo ₂ O ₄ for supercapacitor applications	2016
13.	Mr. Rajat Mondal	MSc.	NiMoO ₄ nanosheets: preparation, characterization and energy storage application	2016
14.	Mr. Alok Pathak	MSc.	Asymmetric supercapacitors	2017
15.	Ms. Manisha Sharma	MSc.	Glucose sensors based on MoO ₃ nanorods	2017
16.	Ms. Maneesha	MSc.	Spinel Oxides for non-enzymatic glucose sensors	2018
17.	Mr. Soumen Mondal	MSc.	Symmetric supercapacitor electrodes	2018

			based on CVD grown metal sulfides	
18.	Mr. Jitendra Kapuria	MSc.	CVD growth of ternary transition metal sulphides for supercapacitor application	2019
19.	Ms. Dipti Tamang	MSc.	Transition metal selenides for supercapacitor electrodes	2019
20.	Ms. Minu Mathew	PhD-discontinued	MXene derived TiO ₂ based materials for photocatalysis	2019
21.	Ms. Sithara R.	PhD	2D materials for photocatalysis and self cleaning applications	2019-cont
22.	Mr. Abhinandan Patra	PhD	2D materials for Energy storage device applications	Complete (2024)
23.	Mr. Aditya Sharma	PhD	Self-powered microsupercapacitors	2019-cont
24.	Mr. Namsheer K.	PhD	Conducting polymers and hybrid materials for supercapacitor applications	Complete (2024)
25.	Mr. Prateek Shinde	PhD	2D TMDs and its hybrids for energy storage and conversion	Thesis submitted
26.	Ms. Aswathy	PhD	2D materials and their hybrids for Energy conversion applications	2019-cont

27.	Ms. Mahima Bhat	MSc.	Hybrid multi-walled carbon nanotubes/Manganese diselenide cubes: Synthesis, characterization and comparative investigation of energy storage performance	2020
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13. Awards and Honors:

S. No.	Name of the award	Awarding agency	Year
1.	Emerging Investigator award	Elsevier	2017
2.	IAAM medal 2017	International Association of Advanced Materials	2017
3.	Nanotechnology & J. Phys. D Outstanding Reviewers award	IOP Publishing, UK	2017
4.	Venus International Foundation (VIFFA) Young Researcher Award	VIFFA, India	2015
5.	ACS membership award in recognition of engagement with ACS's mission of service Life member	ACS publishers	2015-2018
6.	Life Membership	Carbon Society, India	2015
7.	Associate Editor, RSC Advances	RSC Publishers, UK	2015-cont
8.	American Journal of Engineering and Applied Sciences, Science Publications	Science Publications	2015-cont

9.	Associate (Guest Editor), Frontiers in Chem.	Frontiers	2019
10.	Life Membership	Materials Research Soc. Of India (MRSI)	2018-cont
11.	Top 2% Indian Researchers By Stanford Study	Stanford Study	2019-2023
12.	Associate (Guest Editor), Energy	MDPI	2022
13.	Ramanujan Fellowship	SERB	2013

14. Conferences organized

S.No.	Conference name	Date & Year
1.	"International conference on Frontiers in Materials (F2DM)" at CNMS-Jain University	March 13-16, 2019
2.	"International conference on Green methods for separation, purification and nanomaterials synthesis (GMSP & NS)" at CNMS-Jain University	April 24-25, 2018
3.	National seminar on "Frontiers in Materials & Chemical Sciences" at CNMS-Jain University	August 30-31, 2018

15. Invited Talks:

S.No.	Conference Name & Organizer	Date & Year
1.	5 th International conference on advances in energy research (ICAER 2015) organized by IIT Bombay	Dec 15-12, 2015
2.	International conference on multifunctional materials, organized by IITBHU	Oct 27-29, 2015
3.	National conference on Carbon materials, organized by Carbon Society of India, NPL-Delhi	Nov 26-28, 2015
4.	Nanotechnology: Present & Future aspects in Science & Engineering (NASE-16), organized by VSSUT-Burla	July 2-3, 2016

5.	One symposium on recent trends in Physics, organized by Dept. of Physics-Utkal University	Jan 03, 2015
6.	Winter school-2015, organized by JNCASR-Bangalore and University of Cambridge	Dec 02-06, 2013
7.	PSI, organized by Institute of Physics-Bhubaneswar, IACS-Kolkata & IIT Bhubaneswar	Feb. 22-26, 2014
8.	ICONSAT 2014, organized by INST Mohali	March 2-5, 2014
9.	4 th International symposium on energy challenges & Mechanics, Aberdeen-UK	Aug 11-13, 2015
10.	8 th international conference ICMAT 2015 & IUMRS-ICA 2015, Singapore	June 28-July 03, 2016
11.	International conference on perspectives in vibrational spectroscopy (ICOPVS 2016), organized by Lucknow University	November 05-08, 2016
12.	4 th international conference on nanostructured materials & composites (ICNM 2017), organized by MG University	February 10-12, 2017
13.	International conference on new scintillations on materials horizon (NSMH 2016), organized by MJP Pohilkhand University, Bareilly	October 21-23, 2016
14.	International conference on Nanoscience & Nanotechnology 2017, organized by VBRI Institute Allahabad	Feb 28-March 03, 2017
15.	National conference on recent advances on materials for sustainable energy (RAMSE 2018), organized by IIT-ISM Dhanbad	March 3-5, 2018
16.	International conference on recent trends in materials science & technology (ICMST 2018), organized by IIST Trivandrum	October 10-13, 2018
17.	International conference on nanostructured materials & devices (ICNMSD 2018), organized by University of Delhi	December 17-20, 2018
18.	International conference on nanoscience & nanotechnology (ICONN 2019), organized by SRM University	Jan 28-30, 2019
19.	First Indian materials conclave & 30 th annual general meeting of MRSI, organized by MRSI-IISc Bangalore	February 12-15, 2019

20.	Faculty development programme on "Recent trends in Nanoscience & Nanotechnology for Engineering applications", organized by Dayananda Sagar Academy of Technology & Management-Bangalore	March 08, 2019
21.	International conference on Frontiers in Materials (F2DM)" organized by CNMS-Jain University	March 13-16, 2019
22.	International conference on Functional materials, ICFM 2020 organized by IIT Kharagpur	Jan 06-08 , 2020

16. International Travels & Collaboration

- (i) Travelled to University of Southampton, UK during 31.10.2014 to 09.11.2014 to Prof. Hywel Morgan's Laboratory under the UGC-UKIERI project for collaboration purpose.
- (ii) Travelled to University of Campinas, Brazil during 14.01.2015 to 24.01.2015 to Prof. Stansislav Moshkalev and Prof. Rogerio Gelamo under the DST-CnPq project for collaboration purpose.
- (iii) Travelled to University of Southampton, UK during 3.08.2015 to 10.08.2015 to Prof. Hywel Morgan's Laboratory under the UGC-UKIERI project for collaboration purpose.
- (iv) Travelled to National University of Singapore and Singapore during 28.06.2015 to 03.07.2015 to attend the ICMAT 2015 & IUMRS-ICA 2015 and delivered a talk.
- (v) Travelled to Israel Institute of Technology, Technion during 8.06.2016 to 12.06.2016 to deliver an invited talk at Department of Materials Science & Engineering".
- (vi) Travelled to Prof. Ana Orlavo's research group at ITMO University, Russia for 1 month (December 2019)
- (vii) Awarded Brain Pool research fellowship by National Research Foundation of Korea as Visiting Professor at Chungbuk National University, South Korea (August 2023-December 2025).

LIST OF PUBLICATIONS

h-index: 58, i10 index: 180, total citation: 14,000.

1. Spinel NiCo₂O₄ based hybrid materials for supercapacitors: Recent developments and future perspectives, M. Pathak, S.M. Jeong* and **C.S. Rout***, *J. Energy Storage* 2023, 73, 108881. (Impact factor: 9.4).
2. Versatile MXenes as electrochemical sensors for heavy metal ions and phenolic moiety-containing industrial chemicals: recent development and prospects, G. Manasa, and **C.S. Rout***, *Mater. Adv.* 2024, 5, 83. (Impact factor: 5.0).
3. Borocarbonitride-Based Emerging Materials for Supercapacitor Applications: Recent Advances, Challenges, and Future Perspectives, S. Radhakrishnan, A. Patra, G. Manasa, M.A. Belgami, S.M. Jeong* and **C.S. Rout***, *Adv. Sci.* 2024, 11, 2305325. (Impact factor: 15.1).
4. MXene-Carbon based hybrid materials for supercapacitor applications, S. Pavitra, S.M. Jeong* and **C.S. Rout***, *Energy Adv.* 2024, 3, 341.
5. Electrostatic co-assembly of FePS₃ nanosheets and surface functionalized BCN heterostructures for hydrogen evolution reaction, A. Patra, K. Pramoda, S. Hegde, K. Aravind, K. Mosina, Z. Sofer, and **C.S. Rout***, *Dalton Trans.* 2024, 53, 3280.
6. Perspectives of 2D MXene-based materials for self-powered smart gas sensors, S. Atkare, G. Manasa, **C.S. Rout***, S. Jagtap, *Mater. Adv.* 2024, 5, 1440. (Impact factor: 5.0).
7. Elucidating the Energy Storage Performance of 2D Metallic Vanadium DiteLLuride/Carbon Nanotube for Next-Generation Asymmetric Supercapacitors Using Emerging MoSSe/Carbon Nanotube, Sree Raj K.A., S. Radhakrishnan, Namsheer K, J.S. Cho, S. Jeong, and **C.S. Rout***, *Adv. Energy & Sust. Res.* 2024, 2300265 (DOI: [10.1002/aesr.202300265](https://doi.org/10.1002/aesr.202300265)).
8. Frustrated Lewis pairs in two-dimensional borocarbonitride for the facile synthesis of 3-aminoimidazo[1,2-a]pyridines using TMSCN as an isonitrile substitute, J. Leng, **C.S. Rout***, K. Pramoda, K.S. Sarath Kumar, *New J. Chem.* 2024, 48, 5971. (Impact factor: 3.3).
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- 11.
12. Basal plane activation of hierarchical 1T MoS₂/MXene heterostructure by boron insertion for supercapacitor application, S. Radhakrishnan, S. Santosh, Sree Raj K.A, S. Pavitra, B. Chakraborty, S.M. Jeong* and **C.S. Rout***, *J. Mater. Chem. A* 2024, Under Review. (Impact factor: 11.9).
13. Construction of Nickel Molybdenum Sulphide/Black Phosphorous Three-dimensional Hierarchical Structure toward High Performance Supercapacitor Electrodes, M. Pathak, P. Mane, B. Chakraborty, J. S. Cho, S.M. Jeong* and **C.S. Rout***, *Small* 2024, 2310120 DOI: [10.1002/sml.202310120](https://doi.org/10.1002/sml.202310120). (Impact factor: 13.3).
14. 2D/2D Molybdenum Sulfo Selenides/Black Phosphorus Heterostructures for Supercapacitors and Light-Driven Hydrogen Generation Applications, Namsheer K, G. Sanyal, K. Pramoda, B. Chakraborty, J. S. Cho, S.M. Jeong* and **C.S. Rout***, *Adv. Sust. Systems* 2024, DOI: [10.1002/adsu.202300572](https://doi.org/10.1002/adsu.202300572). (Impact factor: 7.1).
15. Engineering 2D Metallic VTe₂ by Hybridization with Nanocarbons for Next Generation Supercapacitor Electrodes, Sree Raj K.A., S. Radhakrishnan, Namsheer K., J. S. Cho, S.M. Jeong* and **C.S. Rout***, *Adv. Energy & Sust. Res.* 2024, Under Revision. (Impact factor: 5.8).
16. Recent Developments and Future Perspectives of Molybdenum Based Borides and MBenes, **C.S. Rout***, P. Shinde, and S.M. Jeong* *Adv. Sci.* 2024, 2308178, DOI: [10.1002/advs.202308178](https://doi.org/10.1002/advs.202308178). (Impact factor: 15.1).
17. MoWS₂ nanosheets incorporated nanocarbons for high energy density pseudocapacitive negatrode material and hydrogen evolution reaction, A. Patra, M. Saikh, S. Ghosh, D.J. Late and **C.S. Rout**, *Sustainable Energy Fuels*. 2022, 6, 2941. (Impact factor: 6.81).
18. All-solid-state flexible supercapacitor based on a binary transition metal dichalcogenide grown on 2D/2D heterostructure materials, A.

- Patra, P. Mane, K. Pramoda, S. Hegde, B. Chakraborty and **C.S. Rout, *J. Energy Storage*** 2023, 68, 107825. (Impact factor: 8.90).
19. Facile in-situ grown spinel $\text{MnCo}_2\text{O}_4/\text{MWCNT}$ and $\text{MnCo}_2\text{O}_4/\text{Ti}_3\text{C}_2$ MXene composites for high-performance asymmetric supercapacitor with theoretical insight, M. Pathak, P. Mane, B. Chakraborty and **C.S. Rout, *J. Energy Storage***, 2023, 66, 107475. (Impact factor: 9.4).
 20. Recent developments in 2D MXene based materials for next generation room temperature NO_2 gas sensors, S. Radhakrishnan and **C.S. Rout, *Nanoscale Adv.*** 2023, 5, 4649. (Impact factor: 4.7).
 21. Room-temperature chemiresistive ammonia sensors based on 2D MXenes and their hybrids: recent developments and future prospects, S. Atkare, S.D. Kaushik, S. Jagtap, and **C.S. Rout, *Dalton Trans.*** 2023, 52, 13831. (Impact factor: 4.5).
 22. 2D MXenes as a Promising Candidate for Surface Enhanced Raman Spectroscopy: State of the Art, Recent Trends, and Future Prospects, A. Patra, Bhavya M.B., G. Manasa, A.K. Samal and **C.S. Rout, *Adv. Funct. Mater.*** 2023, 2306680. (Impact factor: 19).
 23. Enhancing the Ultrafast Third-Order Nonlinear Optical Response by Charge Transfer in VSe_2 -Reduced Graphene Oxide Hybrid, V. Kumar, Afreen, K.A. Sree Raj, P. Mane, B. Chakraborty and **C.S. Rout, K.V. Adarsh, *J. Phys. Chem. C***. DOI: [10.1021/acs.jpcc.3c03693](https://doi.org/10.1021/acs.jpcc.3c03693) (Impact factor: 3.7).
 24. Augmented electrochemical properties of manganese oxide nanorods on low energy nitrogen ion irradiation, A. Patro, M.K. Rajbhar, S. Chatterjee, A. Patra, **C.S. Rout, S. Dhal, *J. Alloys Comp.*** 2023, 960, 170441. (Impact factor: 6.2).
 25. *In-situ* construction of hierarchical 2D $\text{MoS}_2/1\text{D Te}$ hybrid for supercapacitor applications, S. Radhakrishnan, P. Mane, K A Sree Raj, B. Chakraborty and **C.S. Rout, *J. Energy Storage***, 2023, 60, 106703. (Impact factor: 9.4).

26. Single-Wall-Carbon-Nanotube–VSe₂ Nanohybrid for Ultrafast Visible-To-Near-Infrared Third-Order Nonlinear Optical Limiters, V. Kumar, D. Mandal, K.A. Sree Raj, B. Chakraborty, **C.S. Rout, K.V. Adarsh, *Phys. Rev. Appl.***, 2023, 19, 044081. (Impact factor: 4.93).
27. Recent development of two-dimensional tantalum dichalcogenides and their applications, S. Kumar, S. Pratap, N. Joshi, R. Trivedi, **C.S. Rout, B. Chakraborty, *Micro & Nanostructures***, 2023, 181, 207627. (Impact factor: 2.0).
28. C–H Activation of Benzamides Using Biogenically Synthesized Pd@CNTs Catalyst under External Ligand Free Condition: Access to Isoquinolones and A DFT Study of Phytochemicals, R. Hegde, R. Bhondwe, K.A. Sree Raj, Arnab Ghosh, **C.S. Rout, S.A. Patil, R. Dateer, *Chemistryselect***, 2023, 8, e202300673. (Impact factor: 2.3).
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