

Rahul Ravindran Pillai, PhD

Scopus H index: 10. rahulpillaiphd@gmail.com · +91-9409218032 · Bengaluru, Karnataka, India



PROFESSIONAL SUMMARY

Researcher with nine years of experience in electrochemical sensing, 2D nanomaterials, and photocatalytic materials. Core expertise spans Metal oxide-based nanocomposites electrocatalysts, electrochemical sensor development, and solar-driven photocatalysis for environmental remediation. Track record includes 20+ peer-reviewed publications in SCI/Scopus-indexed journals, 3 granted Indian patents.

PROFESSIONAL EXPERIENCE

Assistant Professor — *Department of Science & Humanities, Sairam College of Engineering* · Bengaluru, Karnataka · September 2026 – Present

Project Scientist — *Centre for Equitable and Personalised Healthcare & Centre for Water Security, Plaksha University* · Mohali, Punjab · September 2023 – August 2026

- Designing MXene–metal oxide nanocomposite electrocatalysts for electrochemical detection of catecholamine biomarkers for noninvasive early detection of hepatocellular carcinoma (HCC).
- Designing MXene– β -Ni(OH)₂ nanocomposite electrocatalysts for electrochemical detection of Ascorbic Acid in collaboration with MG University.

Visiting Researcher — *Tyndall National Institute* · Cork, Ireland · November 2025 – December 2025

- Developed a portable potentiostat (Raspberry Pi 3 + LMP91000EVM) validated for electrochemical catechol detection in environmental water samples; a functional prototype for field-deployable electrochemical sensing.

Visiting Researcher — *Indian Institute of Science (IISc) — CeNSE / INUP* · Bengaluru · August 2018 – November 2018

- Principal User, INUP-CeNSE Project (Ref: CeNSE/INUP/PE_rahul_29/2018-19, funded by MeitY, Govt. of India).
- Project: Development of metal oxide heterostructures for nanoelectronics and charge storage applications.

Research Assistant — *CMR Institute of Technology* · Bengaluru, Karnataka · January 2017 – May 2018

- Synthesised metal oxide nanocomposites for photocatalytic degradation of industrial dyes.
- Developed Cu-Al metal oxide composites for catalytic purification of automobile exhaust gases.

Project Scientist — *Institute for Plasma Research (IPR)* · Gandhinagar, Gujarat — Dept. of Atomic Energy · 18 August 2014 – 17 August 2016

- Deposited metal oxide/carbide interface coatings on carbon fibre by RF sputtering and PECVD for thermal barrier applications in fusion reactors.
- Engineered HNT-based polymer composites for adsorption of industrial dyes in collaboration with Gujarat University.

EDUCATION

PhD, Faculty of Applied Sciences — *CMR Institute of Technology* · VTU, Belagavi · May 2018 – August 2023

- Thesis: Nickel Oxide Nanocrystals Based Composites for Electrochemical Catechol Sensing
- Developing ternary rGO–TiO₂–SiO₂ nanocomposites for solar-driven photocatalytic dye degradation

M.Sc., Materials Science — *Sardar Patel University* · Vallabh Vidyanagar, Gujarat · June 2012 – June 2014

- P.G. Department of Materials Science
- Dissertation: Deposition of SiC Coating on Carbon Fabric Substrate by PECVD
- Award: Dr. CNR Rao Education Foundation Prize for Best M.Sc. Project (2014)

B.Sc. (Special), Physics — *St. Xavier's College, Ahmedabad* · Gujarat University · June 2009 – May 2012

- Award: Certificate of Excellence in Research (Physics), St. Xavier's College (2010–11)
- Award: Gold Medal for Undergraduate Research, Xavier's Research Foundation (2012)

RESEARCH GRANTS & FUNDING

Co-Investigator — DST Technology Mission Division (EWO), Govt. of India

- Project: Design and Construction of Amperometric Catechol Biosensor and Investigations on Analyte Interferences for Technology Development to Aid Near-Zero Discharge of Effluents to Indian Water-body Systems
- PI: Dr. B. Narasimha Murthy, CMR Institute of Technology, Bengaluru
- Sanction Order: DST/TMD(EWO)/OWUIS-2018/RS-22(G&C) · Date: 20 January 2020
- Total Grant: ₹38,08,816/- · Duration: 2 years

Principal User — INUP-CeNSE Project, IISc Bengaluru (funded by MeitY, Govt. of India)

- Project: Development of metal oxide heterostructures for nanoelectronics and charge storage applications
- Ref: CeNSE/INUP/PE_rahul_29/2018-19 · Executed: August–November 2018

PATENTS GRANTED

1. A Portable Nano-Biosensor for Catechol Estimation in Aqueous Medium
Dr. Chaitanya Lekshmi Indira, Mr. Vinay B.K., Dr. Rahul Pillai, Dr. E.S. Dwarakadasa, Dr. B. Narasimhamurthy
Patent No. #507341 · Application No. 2202041042043 · Published: 04 December 2020 · Granted
2. Method of Fabricating a Functional Electrode
Dr. Chaitanya Lekshmi Indira, Dr. Rahul Pillai, Mrs. Preetha S., Dr. B. Narasimhamurthy
Patent No. #433448 · Application No. 202141026907A · Published: 02 July 2021 · Granted
3. Method of Preparing Metal Oxide Nanocomposite Catalyst for Nitrogen Oxide Reduction
Dr. Chaitanya Lekshmi Indira, Mr. Prashant Hatti, Dr. Shyamsundar Hegde, Dr. Sounak Roy, Dr. Rahul Pillai et al.
Patent No. #409395 · Application No. 202141050869AA · Granted

AWARDS & ACHIEVEMENTS

2024	Poster Prize — Second Edition, International Conference on Water for Life, IIT Madras (Convenors: Prof. Thalappil Pradeep & Prof. Ligy Philip, 12–14 December 2024)
2014	Dr. CNR Rao Education Foundation Prize — Best M.Sc. Project, awarded through Sardar Patel University from Dr. CNR Rao Education Foundation, IISc-Bengaluru
2012	Gold Medal for Undergraduate Research — Xavier's Research Foundation, St. Xavier's College, Ahmedabad
2010–11	Certificate of Excellence in Research (Physics) — St. Xavier's College, Ahmedabad

TECHNICAL SKILLS

Synthesis Techniques

Sol-gel, hydrothermal, PECVD, RF sputtering, electrochemical deposition, precipitation, chemical oxidative polymerisation, solution casting, high-temperature synthesis, carbonisation, spin coating, dip coating.

Electrochemical Characterisation

Cyclic Voltammetry (CV), Differential Pulse Voltammetry (DPV), Electrochemical Impedance Spectroscopy (EIS), Amperometry, Chronoamperometry — using CH Instruments and LMP91000EVM potentiostats.

Materials Characterisation

XRD, SEM-EDS, UV-Vis Spectroscopy, FTIR, TGA, Optical Microscopy.

Device & Fabrication

Screen-printed electrode (SPE) fabrication, glassy carbon electrode (GCE) modification, PEEK electrode assembly, portable potentiostat development (Raspberry Pi 3 + LMP91000EVM).

Software

Origin Pro, Material Studio, MS Office, Nova (Autolab software).

Languages

English · Hindi · Gujarati · Malayalam · Tamil

SELECTED PUBLICATIONS

Full list available on [Google Scholar](#) · Scopus H-index: 10 · Total citations: 250+ · 20+ peer-reviewed articles

Journal Articles (Selected — chronological, newest first)

1. Shilpa Santosh, R. Pillai et al. Interface Engineered β -Ni(OH)₂/MXene Heterostructure for Electrochemical Detection of Ascorbic Acid. ACS Applied Nano Materials, 2026, doi: <https://doi.org/10.1021/acsanm.6c01492> (Accepted).
2. M. Karadath, R. Balan, R. Pillai et al. Avertroa bilimbi-Derived Microsphere-Hydrochar for Removal of Ciprofloxacin Hydrochloride. Biomass Conversion and Biorefinery, 2026, doi: <https://doi.org/10.1007/s13399-026-07067-0>
3. R. Pillai, I.C. Lekshmi et al. Advancing Catechol Detection via Hierarchically Structured NiO/Graphite Nanocomposite Modified GCE. Int. J. Environ. Anal. Chem. 105(17), 2025. doi:10.1080/03067319.2024.2391013
4. V. Sandhya, R. Pillai et al. Nanoarchitectonics of Hydrothermal Carbonized Sugarcane Juice-Derived Biochar. Nano-Structures & Nano-Objects 39, 2024. doi:10.1016/j.nanoso.2024.101249
5. R. Pillai, R. Balan et al. Biosensing Frontiers: MXenes and Their Composites. In: Age of MXenes, Vol.1, ACS Publishers, pp.213–236, 2023. doi:10.1021/bk-2023-1442.ch009
6. S.M. Baligidad, I.C. Lekshmi, R. Pillai et al. Investigation on Strain Rate Sensitivity of 3D Printed sPEEK-HAP/rGO Composites. J. Manufacturing Processes 79, 2022.
7. S. Preetha, R. Pillai et al. TiO₂-rGO Nanocomposites with High rGO Content via Green Redox Synthesis. Surfaces & Interfaces 30, 2022. doi:10.1016/j.surfin.2022.101812
8. K. Duan, R. Pillai et al. Facile Route to Synthesize n-SnO₂/p-CuFe₂O₄ for Methylene Blue Degradation. RSC Advances 12(26), 2022. doi:10.1039/D2RA01690G
9. A.P. Nambiar, R. Pillai et al. Glutaraldehyde-Crosslinked PVA/Halloysite Composite Films as Adsorbent. Materials Chemistry and Physics 291, 2022. doi:10.1016/j.matchemphys.2022.126752
10. G. Preethi, R. Pillai et al. Role of CQDs in Pristine Zn₂SnO₄ for Photocatalysis Under Sunlight. Diamond & Related Materials 131, 2022. doi:10.1016/j.diamond.2022.109554
11. I.C. Lekshmi, R. Pillai et al. Enhanced Catechol Biosensing on Metal Oxide Nanocrystal Sensitized Graphite Nanoelectrodes. J. Electroanal. Chem. 867, 2020. doi:10.1016/j.jelechem.2020.114190
12. R. Pillai et al. Process Optimisation of SiO₂ Interface Coating on Carbon Fibre by RF PECVD. Surfaces & Interfaces 9, 2017. doi:10.1016/j.surfin.2017.07.002
13. R. Pillai, N. Batra, L.M. Manocha. Deposition of SiC Interface Coating on Carbon Fibre by PECVD. Surfaces & Interfaces 7, 2017. doi:10.1016/j.surfin.2017.03.006

Under Review / In Preparation

- R. Pillai et al. Interface Engineered rGO–TiO₂–SiO₂ Ternary Nanocomposites for Solar-Driven Dye Photodegradation. Journal of Materials Science (submitted), 2026.
- R. Pillai. Role of Polymer–Oxide Interactions Towards Selective Electrochemical Detection of Catechol. (To be submitted), 2026.

CONFERENCE PRESENTATIONS

2024 — International	Poster Prize — Water for Life 2024 (Second Edition), IIT Madras, 12–14 Dec 2024.
2022 — International	Oral presentation— ICETMT2022 (International Conference on Emerging Trends in Materials Science and Technology), CMRIT + MRSI, Online, 10–11 Feb 2022.
2021 — International	Oral presentation — FRESM'21 (International Conference on Futuristic Research in Engineering Smart Materials), CMRIT + Gyeongsang National University, South Korea, Online, 23–24 Apr 2021. Paper: Electrochemical Detection of 1,2-Benzenediol Using NiO Nanocrystal Modified PEEK Electrodes.
2014 — National	Poster/Oral — SIMST-2014 (Symposium on Innovations in Materials Science & Technology), Sardar Patel University, Vallabh Vidyanagar, 15–16 Mar 2014.
2011 — International	Poster presentation — ISACCNM-2011 (International Symposium on Advanced Ceramics, Composites and Nanostructured Materials), Sardar Patel University, 17–18 Feb 2011.
2011 — National	Poster presentation— Physics for Tomorrow (National Conference), St. Xavier's College, Ahmedabad, 3–4 Mar 2011.
2010 — National	Participated / NCIEP — 25th Annual IAPT Convention & Symposium, Saurashtra University, Rajkot, 21–23 Oct 2010.

LABORATORY ESTABLISHMENT & LEADERSHIP

- Led establishment of the materials characterisation laboratory in the Fusion Reactor Materials & Characterisation Division, Institute for Plasma Research, Gandhinagar (2014–2016).
- Team lead in setting up the Centre for Excellence in Materials and Sensors at CMR Institute of Technology, Bengaluru (2018–2023).
- Led setup of the materials laboratory at the Centre for Water Security, Plaksha University, Mohali (2023–present).

WORKSHOPS, FDPS & TRAINING PROGRAMMES

Jan 2020	Ten Days Workshop on Research Methodology — VTU-HRDC, Centre for PG Studies, Muddenahalli, Chikkaballapur (17–26 Jan 2020)
Jul 2020	Webinar — Graphene: A Honeycomb Exotica — CMR University, Bengaluru (14 Jul 2020)
Sep 2020	Webinar Workshop — Surface Engineering & Modification for Better Performance — Electrochemical Society of India (ECSI), IISc Campus (19 Sep 2020)
Dec 2021	FDP on Electron Microscopy — Physics Department, CMR Institute of Technology (11 Dec 2021)
Nov 2010	Winter Programme — Advanced B.Sc. Physics — IAPT / Gujarat Science Academy, Bhavan's College, Dakor (13–19 Nov 2010)
Dec 2010	Workshop on Quantum Mechanics — IAPT RC-7 / INSA / VASCSC, Ahmedabad (17 Dec 2010)
Jul 2011	Workshop on Computers in Physics Lab — IAPT RC-7 / Gujarat Science City, Ahmedabad (24 Jul 2011)

PEER REVIEW SERVICE

Active reviewer for: Journal of Materials Science and Engineering B · Journal of Coatings Technology and Research · Current Organic Chemistry · Materials Today Proceedings · Ionics · RSC journals