ST. XAVIER'S COLLEGE (Autonomous), PALAYAMKOTTAI – 627 002.

(Recognized as "College with Potential for Excellence" by UGC & Accredited at A^{++} Grade with a CGPA of 3.66 out of 4 in IV Cycle by NAAC)

ANNUAL REPORT 2024-2025

ENERGY RESEARCH CENTRE (2022)

The **Energy Research Centre** at **St. Xavier's College, Palayamkottai**, is actively engaged in pioneering research on **energy storage, solar cells, and battery applications**. Under the guidance of **Dr. S. Anna Venus, Assistant Professor & Research Supervisor**, four research scholars are currently conducting their doctoral studies, focusing on cutting-edge advancements in these domains. The lab is well-equipped with state-of-the-art instruments, including a **magnetic stirrer with a hot plate, hot air oven, centrifuge, weighing balance, autoclave, desiccator, and microwave oven**, providing a robust foundation for experimental research.

The research scholars have made remarkable contributions to the field. **C. Bhagya Lakshmi** initiated her research in **July 2019**, working on **"Synthesis & Characterization of Nanocomposites for Opto-Electronic Applications"**, funded by the **RFRS 19-20 project with a ₹3 lakh grant**, successfully completed over two years. **S. Jeya Lakshmi**, who started her research in **January 2020**, focused on **"Investigation and Characterization of Polymer Nanocomposites for Engineering Applications."** Her work has been successfully submitted for evaluation. **D. Sher Meena** commenced her research in **January 2022**, focusing on **"Synthesis, Characterization, and Electrochemical Performance of New-Generation Hybrid Materials for Economic and Ultrastable Green Energy Storage Applications,"** an ongoing project. **D. Catherine Denisha**, who began her research in **December 2023**, is working on **"Biosynthesis of Bio-Nanocomposites as Electrolytes for High-Performance Energy Storage Devices."** Additionally, **B. Delphine** is set to start her research in **February 2025**, focusing on **"High-Durability Platinum-Based Oxygen Reduction Catalysts for Proton Exchange Membrane (PEM) Fuel Cells."**

The scholars have actively participated in national and international conferences, workshops, and research collaborations. **S. Jeya Lakshmi** presented research findings on **bio-host polysaccharide-based solid electrolytes** at the **National Conference on Recent Developments in Effective Materials (REDEEMS'24) at Sarah Tucker College, Tirunelveli**, and delivered another paper at the **International Conference on Nano Materials Characterization, Hydrogen Energy, and Fuel Cells (ICWNF 2025) at St. Xavier's College, Palayamkottai**. She also visited **Saveetha University, Chennai**, for project-based knowledge exchange and successfully submitted her **Ph.D. thesis on March 3, 2025**.

D. Sher Meena has actively contributed to research discussions, presenting her work on **nanomaterials for electrochemical applications** at the **International Conference on Advanced Materials and Their Applications at V.O. Chidambaram College, Tuticorin**, and on **aluminium-based nanocomposites for energy storage** at the **International Conference at St. Xavier's College, Palayamkottai**. She also participated in specialized **webinars on Higher Education Opportunities in Taiwan, 2D Materials, Porous Polymers, and Quantum Engineering**, as well as a **workshop on Bibliometrics Using VOS Viewer & R Studio** at **St. Xavier's College**.

D. Catherine Denisha has presented her research on **Mn-doped ZnS nanocomposites for photocatalytic degradation** at the **International Conference on Recent Advancements in Materials Science and Nuclear Energy Research (ICRAMNR-2024) at Government Arts and Science College, Kovilpatti**. She has also attended a **national webinar on dielectric spectroscopy**, a **conference on higher education research scholarships**, and a **hands-on bibliometrics workshop at St. Xavier's College**. Her research on **biopolymer electrolytes for energy storage** was presented at the **International Conference at St. Xavier's College, Palayamkottai**.

In addition to individual research achievements, **B. Delphine** is collaborating with **Aatral Innovations Private Limited, Chennai**, further strengthening industry-academic partnerships. The department has also secured **funding under the St. Xavier's College Research Grant (SXCRG) for 2024-2025**, with **Dr. S. Anna Venus** leading a project titled **"Investigation of Biopolymer-Based Magnesium Batteries by Solution Casting Technique."** With ongoing research, active participation in global scientific discussions, and a strong foundation in **energy materials and sustainable technologies**, the **Energy Research Lab** continues to push the boundaries of scientific innovation. The lab remains committed to fostering high-impact research, interdisciplinary collaborations, and real-world applications in the field of energy storage and conversion.