PERSONAL INFORMATION

Rafiq Ur Rehman

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RESEARCH INTERESTS Materials Science | Electrochemistry | Energy Materials | Renewable Energy

EDUCATION

Oct 2020 – Jan 2023 **Master of Science in Chemical Engineering (CGPA 3.50/4.0)**
National University of Sciences & Technology (NUST), Islamabad, Pakistan

Thesis title: Optimization of MoP/r-GO based hybrids for electrochemical water splitting

- Fabrication and characterization of MoP/r-GO hybrid electrocatalysts.
- Optimization of overpotential and Tafel slope for enhanced catalytic activity.
- Evaluation of hydrogen evolution reaction performance using the prepared hybrids.

Sep 2016 - Oct 2020 **Bachelor of Science in Chemical Engineering (CGPA 3.41/4.0)**
COMSATS University Islamabad, Lahore Campus, Lahore, Pakistan

Thesis title: Production of 170 metric tons per day (MTPD) of 2-methoxy-2-methylheptane by methanol and 2-methoxy-1-heptene

- Process design to produce 170 MTPD of 2-methoxy-2-methylheptane.
- Optimization of reaction conditions for maximum yield and efficiency.
- Assessment of the economic and environmental impacts of the production process.

PUBLICATIONS

U Sohail, E Pervaiz, R Khosa, M Ali. “Electrocatalytic Activity of Tungsten Carbide Hybrids with two Different MOFs for Water Splitting: A Comparative Analysis”. Nanoscale Advances, 2024, https://doi.org/10.1039/D4NA00289J.

R Khosa, E Pervaiz, U Abdullah, U Sohail. “Highly porous interconnected MoP decorated graphene oxide as remarkably efficient electrocatalyst”. Heliyon, 2023, 9, e19313. https://doi.org/10.1016/j.heliyon.2023.e19313.

R Khosa, E Pervaiz, U Abdullah, M Ali, U Sohail, A Shakoor. “An Insight on Molybdenum Phosphide and its Hybrids as Catalyst for Electrochemical Water splitting: A Mini-Review”. Molecular Catalysis, 2022, 528, 112514. https://doi.org/10.1016/j.mcat.2022.112514.

AS Sabir, E Pervaiz, R Khosa, U Sohail. “An inclusive review and perspective on Cu-based materials for electrochemical water splitting”. RSC Advances, 2023, 13, 4963-4993. https://doi.org/10.1039/D2RA07901A.

U Sohail, E Pervaiz, M Ali, R Khosa, A Shakoor, U Abdullah. “Role of Tungsten Carbide (WC) and its Hybrids in Electrochemical Water Splitting Application-A Comprehensive Review”. FlatChem, 2022, 35, 100404. https://doi.org/10.1016/j.flatc.2022.100404.

U Abdullah, M Ali, E Pervaiz, R Khosa. “An inclusive perspective on the recent development of tungsten-based catalysts for overall water-splitting: A review”. International Journal of Energy Research, 2022, 46, 10228-10258. https://doi.org/10.1002/er.7800.

EXPERIENCES

Feb 2023 - Aug 2024 **Research Scholar**
Heterogeneous Catalysis Lab, SCME, NUST

- Extensive research experience in synthesizing various materials and handling projects on water splitting at Heterogeneous Catalysis Lab, NUST.

June - Aug 2021 **Internship**
PepsiCo Pakistan (Pvt) Ltd., Gujranwala, Pakistan

- PepsiCo is one of Pakistan’s dominant food and beverage companies.

July - Aug 2019 **Internship**
Suraj Fertilizer Industries (Pvt) Ltd., Sahiwal, Pakistan

- It is the largest single-superphosphate and sulfuric acid manufacturer in the country.

July - Aug 2018 **Internship**
DG Khan Cement Company (Pvt) Ltd., Dera Ghazi Khan, Pakistan

- DGKCC is a strategic business unit of Nishat Group, which is diverse industrial group in Pakistan.

PROJECTS

2020 **Simulation of FYP:** Effectively simulated the design and calculations for the Final Year Project using Aspen Plus software.

2019 **Chemical Engineering Process Design Project:** Studied and designed the project on the “Organic Rankine Cycle”.

2019 **Fertilizer Plant Project:** Presented a project on the process of Suraj Fertilizer Industries (Pvt) Ltd., Pakistan.

TECHNICAL SKILLS

- Proficient in using major lab equipment for synthesizing pure and hybrid catalysts.
- Extensive hands-on experience with electrochemical workstations, performing LSV, EIS, and CV for HER and OER.
- Trained in materials characterization techniques, including XRD, SEM, FTIR, and RAMAN spectroscopy.

CONFERENCES

April 2024 **2nd International Conference on Modern Technologies in Mechanical & Materials Engineering (MTME 2024)**
GIK Institute, Topi, Pakistan

- Presented a poster presentation at MTME 2024 on the title "Solid Oxide Electrolysis Cell Efficiency Using Advanced Materials for Sustainable Energy Solutions".

November 2023 **6th Conference on Emerging Materials and Processes (CEMP 2023)**
SCME, NUST, Islamabad, Pakistan

- Delivered a compelling presentation at CEMP 2023 on the topic "Development of Highly Active Catalysts for Water Splitting Reactions".

CAREER DEVELOPMENT

Feb – April 2020 **Career-Prep Fellow**
Amal Academy, Lahore, Pakistan

An education start-up funded by Stanford University that teaches professional skills students and corporations

- Communication: Completed a competitive written application and interview process to be selected from over 4500 applicants for an intensive 3-month fellowship funded by Stanford University.
- Skills development: Invested 150 hours in enhancing key business skills including communication, leadership, problem-solving, and teamwork.

IELTS ACADEMIC

Listening	Speaking	Writing	Reading	Overall Score
7.0	6.5	6.0	6.0	6.5

CERTIFICATIONS

- Worked as a member of the AIChE COMSATS Chapter CHEMETHON 1.0 Management.
- Completed a one-month Technical Support Engineer Program at Resourcex.io, focusing on troubleshooting various machines.

AWARDS

- Awarded a merit-based laptop through the Prime Minister's Laptop Scholarship Scheme.
- Received a merit-based semester fee scholarship at COMSATS University.
- Earned a merit-based scholarship laptop award from PAEC Higher Secondary School.

REFEREES

Dr. Erum Pervaiz, Professor
School of Chemical & Materials Engineering (SCME)
National University of Sciences & Technology (NUST), Pakistan
Email: erum.pervaiz@scme.nust.edu.pk

Dr. Asad Ullah Khan, Professor
School of Chemical & Materials Engineering (SCME)
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Dr. Waheed Miran, Associate Professor
School of Chemical & Materials Engineering (SCME)
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