CURRICULUM VITEA



Dr. Gul Rahman

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Education

2010-2013	PhD (Physical Chemistry/ Clean Energy and Chemical Engineering)	**Korea Institute of Science and Technology (KIST)**, Seoul, Republic of Korea; The **University of Science and Technology (UST)**, Deajeon, Republic of Korea
2008-2010	M.S (Physical Chemistry)	**Hallym University** Chuncheon, Republic of Korea
2005-2007	M.Sc (Physical Chemistry)	**Quaid-i-Azam University** Islamabad, Pakistan
2001-2004	B.S.Ed (Chemistry, Biology, Education)	**University of the Punjab**, Pakistan

Ph.D Thesis

Nanostructured α-Fe_2O_3 Photoanodes for Solar Hydrogen Production from Water Splitting

Thesis Advisor: Dr. Oh-Shim Joo (Head), Principle Research Scientist, Clean Energy Research Center, KIST, Seoul, Republic of Korea

M.S Thesis

Electrochemical Reduction of Carbon Dioxide

Thesis Advisor: Young Chang Hee, Professor, Department of Chemistry, Hallym University Chuncheon, Republic of Korea

Employment History:

- 02/2025-current: **Professor (Tenured),** University of Peshawar, Peshawar Pakistan
- 02/2021- 02/2025: **Associate Professor (Tenured),** University of Peshawar, Peshawar Pakistan
- 01/2015- 02/2021: **Assistant Professor**, University of Peshawar, Peshawar Pakistan

- 11/2013-07/2014: **BK 21 Plus Post-Doc. Researcher**, Electronic & Energy Materials Research Lab, Department of Materials Science and Engineering, Yonsei University, Seoul, Republic of Korea

- 09/2013-11/2013: **Visiting Research Scientist**, Clean Energy Research Center, Korea Institute of Science and Technology (KIST), Seoul, Republic of Korea

- 03/2010-08/2013: **Research Assistant**, Clean Energy Research Center, Korea Institute of Science and Technology (KIST), Seoul, Republic of Korea

- 03/2008-02/2010: **Research Assistant**, Department of Chemistry, Hallym University, Chuncheon, Republic of Korea

- 05/2003-09/2007: Part-time **Lecturer**, Khattak Science and Commerce Academy, I-8/1, Islamabad Pakistan

Research Interests:

- Energy storage and conversion devices (Batteries, Supercapacitors, PEC water splitting)
- Nanostructured thin films synthesis and characterization
- DSSCs and Thin film solar cells
- Electrocatalysis and Photocatalysis
- Electrochemical water splitting
- Non-enzymatic biosensors

Patents:

1. **Gul Rahman**, Noureen Amir Khan "**Novel Electrocatalyst Based on Zinc-Substituted Nickel Ferrites for Overall Water Splitting**" Patent No. 523/2023; R.No. 23041163; dated 10-08-2023, Intellectual Property Organization, Karachi, Pakistan.
2. **Gul Rahman**, Haroon Khan "**Green Synthesis of Bismuth Oxide Nanoparticles Using Plant Extract and Application thereof**" Patent No. 290/2025; R. No: 25041565; dated 09-05-2025, Intellectual Property Organization, Karachi, Pakistan.

Research Projects

1. Hydrogen Fuel Generation Via Photoelectrochemical Water Splitting Over Iron-Based Photoelectrodes – funded by **Higher Education Commission (HEC), NRPU 2017-18 (Rs. 6.7 million) (P.I) (Completed)**
2. Nitrogen doped Carbon/Metal Oxides Composite as Efficient Electrocatalyst for Water

Splitting– Funded by **Korea Institute of Science and Technology (KIST), Seoul Republic of Korea** (**14000 USD) (P.I) (2018-19) (Completed)**

3. Development of Earth-abundant Nickel Sulfide as Efficient Electrocatalyst for Hydrogen Evolution Reaction – Funded by **Korea Institute of Science and Technology (KIST), Seoul Republic of Korea** (**14000 USD) (P.I) (2017-18) (Completed)**
4. Rational Design and Fabrication of Nanostructured Hematite Photoanodes for Solar Water Splitting: Effect of Overlayer and Underlayer on Water Splitting Efficiency – Funded by **Korea Institute of Science and Technology (KIST), Seoul Republic of Korea** (**17000 USD) (P.I) (2016-17) (Completed)**
5. Solution-based synthesis and characterization of $BiVO_4$ nanocrystals – Funded by **Higher Education of Pakistan (HEC)**. (SRGP-21-521; **0.48 million**) **(P.I) (Completed)**

Awards and Excellences:

- **Best Poster Award** by **International Society of Electrochemistry** at PU INTERNATIONAL SYMPOSIUM ON ADVANCED ENERGY STORAGE MATERIALS (PU-AESM-219), **Nov. 04-06, 2019**, Department of Physics, University of the Punjab, Lahore, Pakistan

- **Poster Competition Award**, 3rd Position in National Conference on Green Energy Technologies, 18th May **2017**, organized by USAID and Center for Advanced Studies in Energy, UET Peshawar, Pakistan

- **ORIC Innovation Award,** 3rd Conference on Sustainability in Process Industry19-20th Oct. **2016**, UET Peshawar, Pakistan

- **B.K 21 Plus Post doc fellowship** for the year 2014, awarded by Ministry of Science and Technology, South Korea, at Yonsei Unviersity Seoul, Korea

- **Visiting Scientist fellowship, 2013**, Korea Institute of Science and Technology (KIST), Seoul, Republic of Korea

- **Academic Excellence Award** on 20th Aug. **2013**, awarded by Korea Institute of Science and Technology (KIST), Seoul, Republic of Korea

- **Excellence Award** on 16th Aug. **2013**, awarded by The University of Science and Technology (UST) Deajeon, Republic of Korea

- **Award for outstanding research achievements**; Award for excellent paper in the year 2010, 29th June, **2011**, awarded by The University of Science and Technology (UST) Deajeon, Republic of Korea

- International R&D Academy **doctoral fellowship** (2010-2013), Korea Institute of Science and Technology (KIST), Seoul, Republic of Korea

- Full-fledged **Scholarship** for M.S. degree (2008-2010), Hallym University, Chuncheon, Republic of Korea

- **Position award certificate** on 10th May, 2008 (M.Sc) by Quaid-i-Azam University Islamabad, Pakistan

- Scholarship "**Talent Farming Scheme**" for the year **2006**, Higher Education Commission of Pakistan

List of Publications:

1. Haroon Khan, **Gul Rahman***, Sang Youn Chae, Anwar ul Haq Ali Shah, Noureen Amir Khan, Fatima Muslim "Phytochemical-Assisted Green Synthesis of Bi_2O_3 Nanoparticles for Efficient Electrochemical Energy Storage" **New Journal of Chemistry 2026** (Under Review).
2. Abdul Wahab, Hafiz Muhammad Tofil, **Gul Rahman***, Dang Le Tri Nguyen, Anwar ul Haq Ali Shah, Oh Shim Joo "Cadmium sulfide-based nanostructures for next-generation multifunctional applications: Design strategies, decoding performance limitations, and recent advances" **ChemCatChem** 18 **(2026)** 70837.
3. Hamsa Noureen, Javed Iqbal, Ata ur Rahman, Muhammad Yaseen, Rozina Khattak, Waseem Hassan, **Gul Rahman** "Enhanced Electrochemical and Dielectric Properties of GNP/Polypyrrole Nanocomposites for High-Performance Sustainable Supercapacitors" **iScience 29 (2026)** 116346.
4. Sumeet Malik, Adnan Khan, **Gul Rahman** et. al "Fabrication of an electrochemical sensor based on magnetic molecularly imprinted polymer for detection of Sunset Yellow dye" **Scientific Reports** 16 **(2026)** 6369.
5. Uroosa Riaz, **Gul Rahman***, Sang Youn Chae, Anwar ul Haq Ali Shah "Non-stoichiometric three dimensional (Ni,Cd)S hybrid electrodes for high performance supercapacitor application" **Inorganic Chemistry Communication**" 186 (**2026)** 116244.
6. Sumeet Malik, Adnan Khan, **Gul Rahman**, Hamayun Khan, etc. "Facile synthesis of Magnetic Molecularly Imprinted Polymers (MMIPS) based Electrochemical Sensor for Investigation of enhanced sensing performance of Sunset Yellow dye" **Journal of Materials Science** 61 (**2026**) 5558-5577.
7. Eman Gul, Zeeshan Haider, Tanveer Hussain Bukhari, Mashkoor Ahmad, **Gul Rahman***, Amjad Nisar "POM@CNT hybrid nanostructure enabling fast kinetics and high capacity in lithium-ion batteries" **Materials Chemistry Frontiers** 9 (**2025**) 2571.
8. Imran Khan, Anwar Ul Haq Ali Shah, **Gul Rahman**, Salma Bilal "Direct Electrochemical Environmental Sensing of Inorganic Phosphate Using Zinc Ferrite-Integrated Polyaniline Electrode" **Surfaces and Interfaces** 70 **(2025)** 106819.
9. Anwar ul Haq Ali Shah, Javeria Abbas, Muhammad Kamran, **Gul Rahman**, Salma Bilal "Titania/Bismuth vanadate embedded Polyaniline for enhanced electrochemical energy storage" **Inorganic Chemistry Communications** 176 **(2025)** 114272.
10. Sheraz Ahmad, Shabeer Ahmad Mian, Akbar Hussain, Ejaz Ahmed, Muhammad Saleem Khan, **Gul Rahman**, Joonkyung Jang "Environmental Carbonaceous Aerosols Conversion into Methanol using a Zinc-decorated ZnO Nanocage" **Materials Chemistry and Physics** 339 **(2025)** 130648.
11. Noureen Amir Khan, **Gul Rahman***, Sang Youn Chae, Anwar ul Haq Ali Shah, Oh Shim Joo, Shabeer Ahmad Mian, Akbar Hussain "Boosting Electrocatalytic Hydrogen Generation from Water Splitting with Heterostructured $MoS_2/NiFe_2O_4$ Composites in Alkaline Media" **International Journal of Hydrogen Energy** 69 **(2024)** 261-271.
12. Noureen Amir Khan, **Gul Rahman***, Sang Youn Chae, Noyoung Min, Anwar Ul Haq Ali Shah, Shabeer Ahmad Mian "Unraveling the Electrocatalytic Response of Zn Substituted Nickel Ferrite for Overall Water Splitting" **ACS Applied Energy Materials** 7 (**2024)** 4960-4974.
13. Muhammad Imran, Tanveer Hussain Bukhari, Yuefeng Wu, Zohaib Rana, Eman Gul, **Gul Rahman** et. al "Tuning Kinetics of SnS/Ni_3S_4 Binary Sulfides for High Rate and Long Cyclic Lithium-ion Batteries" **New Journal of Chemistry** 48 **(2024)** 2755-2763.

14. Sheraz Ahmad, Akbar Hussain, Shabeer Ahmad Mian, **Gul Rahman**, Shoukat Ali, Joonkyung Jang "Sensing and Conversion of Carbon Dioxide to Methanol Using Ag-decorated Zinc Oxide Nanocatalyst" **Materials Advances** 5 (**2024)** 1119-1129.
15. Shabeer Ahmad Mian, Akbar Hussain, Abdul Basit, **Gul Rahman**, Ejaz Ahmad, Joonkyung Jang "Molecular Modeling and Simulation of Transition Metal-Doped Molybdenum Disulfide Biomarkers in Exhaled Gases for Early Detection of Lung Cancer" **Journal of Molecular Modeling** 29 **(2023)** 225**.**
16. Amjad Khan, **Gul Rahman***, Anwar Ul Haq Ali Shah, Sang Youn Chae, Shabeer Ahmad Mian "Shape Controlled Growth of Hierarchical NixSy on Stainless Steel by Solution Processing with Enhanced Electrochemical Energy Storage Performance" **New Journal of Chemistry** 47 (**2023)** 13269.
17. Sumeet Malik, Adnan Khan, Hamayun Khan, **Gul Rahman**, Nauman Ali, Sabir Khan, Maria Del Pilar Taboada Sotomayor "Biomimetic Electrochemical Sensors based on core-shell imprinted polymers for targeted Sunset Yellow estimation in environmental samples" **Biosensors** 13 (**2023)** 429.
18. Noureen Amir Khan, **Gul Rahman***, Tung M. Nguyen, Anwar Ul Haq Ali Shah, Cham Q. Pham, Minh Xuan Tran, Dang Le Tri Nguyen "Recent Development of Nanostructured Nickel Metal-Based Electrocatalysts for Hydrogen Evolution Reaction: A Review" **Topics in Catalysis** 66 (**2023)** 149-181.
19. Muhammad Kamran Khan, Anwar Ul Haq Ali Shah, **Gul Rahman**, Salma Bilal, Phillip Rose "Investigation of Alumina-Doped Prunus domestica Gum Grafted Polyaniline Epoxy Resin for Corrosion Protection Coatings for Mild Steel and Stainless Steel" Polymer 14 **(2022)** 5128.
20. Asim Mahmood, Saraf Khan, Anwar Ul Haq Ali Shah, **Gul Rahman**, Adnan Khan, Nabi Ullah "Challenge and Innovative Strategies Related to Synthesis and Electrocatalytic/Energy Storage Applications of Metal Sulfides and its Derivatives" **Journal of Electroanalytical Chemistry** 923 **(2022)** 116760.
21. Kamran Khan, Anwar Ul Haq Ali Shah, **Gul Rahman**, Salma Bilal "Potential Impacts of Prunus domestica Based Natural Gum on Physicochemical Properties of Polyaniline for Corrosion Inhibition of Mild and Stainless Steel" **Polymers** 14 **(2022)** 3116.
22. Eman Gul, **Gul Rahman** et. al., "Amphiphilic Polyoxometalate-CNTs Nanohybrid as Highly Efficient Enzyme-free Electrocatalyst for H_2O_2 Sensing" **New Journal of Chemistry** 46 **(2022)** 16280-16288.
23. **Gul Rahman***, Abdur Rahim, Noureen Amir Khan, Anwar Ul Haq Ali Shah, Burhan Khan, Sang Youn Chae "Effect of SnO_2 incorporation on the photoelectrochemical properties of α-Fe_2O_3–SnO_2 nanocomposites prepared by hydrothermal method" **Materials Chemistry and Physics** 286 **(2022)** 126201.
24. Sumeet Malik, Adnan Khan, **Gul Rahman**, Nauman Ali, Hamayun Khan, Sabir Khan, Maria D.P.T. Sotomayor "Core-shell magnetic molecularly imprinted polymer for selective recognition and detection of sunset yellow in aqueous environment and real samples" **Environmental Research** 212 **(2022)**113209.
25. Anwar Ul Haq Ali Shah, Sadaf Zia, **Gul Rahman**, Salma Bilal "Performance Improvement of Gold Electrode towards Methanol Electrooxidation in Akaline Medium: Enhanced Current Density Achieved with Poly(aniline-co-2-hydroxyaniline) Coating at Low Overpotential" **Polymers** 14 **(2022)** 305.
26. Muhammad Ilyas, Shabeer Ahmad Mian, Abdur Rauf, Ejaz Ahmad, **Gul Rahman**, Arindam Sunnyal, Joonkyung Jang "Stimulated reversal of the strong adhesion of catechol onto a silica surface" **Bulletin of the Korean Chemical Society** 43 **(2022)** 210-2014.
27. Ata Ur Rahman, Muhammad Bilal, Muhammad Yaseen, **Gul Rahman*** "Rational Design of Broadly Absorbing Boron Dipyrromethene-Carbazole Dyads for Dye-Sensitized Solar Cells: A DFT Study" **ACS Omega** 6 **(2021)** 27640-27653.

28. Ata Ur Rahman, Hamsa Noureen, Zeeshan Nawaz, Javed Iqbal, **Gul Rahman** and Muhammad Yaseen "Synthesis of Graphene nanoplatelets/polythiophene as a high performance supercapacitor electrode material" **New Journal of Chemistry** 45 **(2021)** 16187.
29. Van Chinh Hoang, Thanh-Son Bui, Huong T.D. Nguyen, Thanh T. Hoang, **Gul Rahman**, Quyet Van Le, Dang Le Tri Nguyen, "Solar-driven conversion of carbon dioxide over nanostructured metal-based catalysts in alternative approaches: Fundamental mechanisms and recent progress" **Environmental Research** 202 **(2021)** 111781.
30. Hamsa Noureen, Javed Iqbal, Waseem Hassan, **Gul Rahman**, Muhammad Yaseen and Ata Ur Rahman, "Synthesis of graphene nanoplatelets/polythiophene nanocomposites With Enhanced Photocatalytic Degradation of Bromophenol Blue and Antibacterial Properties" **Materials Research Bulletin** 142 **(2021)** 11145.
31. Adeel Mehmood, **Gul Rahman***, Anwar Ul Haq Ali Shah, Oh Shim Joo, Shabeer Ahmad Mian, "Template-free Hydrothermal Growth of Nickel Sulfide Nanorods as High-Performance Electroactive Material for Oxygen Evolution Reaction and Supercapacitors" **ACS Energy & Fuels** 35 **(2021)** 6868-6879.
32. Quyet Van Le, Van-Huy Nguyen, Trinh Duy Nguyen, Ajit Sharma, **Gul Rahman**, Dang Le Tri Nguyen "Light-driven reduction of carbon dioxide: Altering the reaction pathways and designing photocatalysts toward value-added and renewable fuels" **Chemical Engineering Science** 237 **(2021)** 116547.
33. Abdur Rauf, Muhammad Adil, Shabeer Ahmad Mian, **Gul Rahman**, Ejaz Ahmed, Zia Mohy Ud, Din, Qun Wei "Tuning the Optoelectronic Properties of Hematite with Rhodium Doping for Photoelectrochemical Water Splitting Using Density Functional Theory Approach" **Scientific Reports** 11 **(2021)** 41.
34. Kifayat U Rahman, Elias P. Ferreira, Ghaws U Rahman, Rashida Perveen, Andreia S. Monterio, **Gul Rahman**, Quyet Van Le, Rafail R. Domenequetti, Sidney J.L. Ribeiro, Sajjad Ullah "Flexible bacterial cellulose-based BC-SiO2-TiO2-Ag membranes with self-cleaning, photocatalytic, antibacterial and UV-shielding properties asa potential multifunctional material for combating infections and environmental applications" **Journal of Environmental Chemical Engineering** 9 **(2021)** 104708.
35. Akbar Ali, Afzal Shah, Faiza Jan Iftikhar, Ghulam Ali, Hyuksu Han, **Gul Rahman** " In-situ formation of an efficient trimetallic (Cu-Zn-Ag) electrocatalyst for water oxidation" **International Journal of Energy Research** 45 **(2021)** 2931-2944**.**
36. Zainab Najaf, Dang Le Tri Nguyen, Sang Youn Chae, Oh-Shim Joo, Anwar Ul Haq Ali Shah, Dai-Viet N Vo, Van-Huy Nguyen, Quyet Van Le, **Gul Rahman*** "Recent trends in development of hematite (α-Fe2O3) as an efficient photoanode for enhancement of photoelectrochemical hydrogen production by solar water splitting" **International Journal of Hydrogen Energy** 46 **(2021)** 23334-23357.
37. **Gul Rahman***, Adil Akhtar, Noureen Amir Khan, Sang Youn Chae, Anwar Ul Haq Ali Shah, Oh-shim Joo "Direct Growth of Duel-Faceted $BiVO_4$ Microcrystals on FTO-coated Glass for Photoelectrochemical Water Oxidation" **OPTIK** 224 **(2020)** 165516.
38. **Gul Rahman***, Wareeda Nawab, Wagma Zazai, Salma Bilal, Anwar Ul Haq Ali Shah, Shabeer Ahmad Mian "Exploring the structural and charge storage properties of Ni–ZnS/ZnO composite synthesized by one-pot wet chemical route" **Materials Chemistry and Physics** 252 **(2020)** 123203.
39. Anwar ul Haq Ali Shah, Sami Ullah, Salma Bilal, **Gul Rahman**, Humaira Seema, "Reduced Graphene Oxide/Poly(Pyrrole-co-Thiophene) Hybrid Composite Materials: Synthesis, Characterization, and Supercapacitive Properties" **Polymers** 12 **(2020)**1110.
40. **Gul Rahman***, Zainab Najaf, Anwar ul Haq Ali Shah, Shabeer Ahmad Mian, "Investigation of the structural, optical, and photoelectrochemical properties of α-Fe_2O_3 nanorods synthesized via a facile chemical bath deposition" **Optik** 200 **(2020)** 163454.

41. Amir Muhammad, Anwar ul Haq Ali Shah, Salma Bilal, **Gul Rahman**, "Basic Blue Dye Adsorption from Water using Polyaniline/Magnetite (Fe3O4) Composites: Kinetic and Thermodynamic Aspects" **Materials** 12 **(2019)** 1764.
42. **Gul Rahman*,** Mansoor Khan, Zahid Khan, Anwar-ul-Haq Ali Shah, Muhammad Saleem Khan, Luqman Ali Shah. "Nickel Oxide-incorporated Polyaniline/Polyvinyl Alcohol Composite for Enhanced Antibacterial Activity" **Zeitschrift für Physikalische Chemie** 233 **(2019)** 1-14.
43. **Gul Rahman***, Zainab Najaf, Asad Mehmood, Salma Bilal, Anwar ul Haq Ali Shah, Shabeer Ahmad Mian, Ghulam Ali, An Overview of the Recent Progress in the Synthesis and Applications of Carbon Nanotubes" **Journal of Carbon Research** 5 **(2019)** 1-31.
44. Chae Sang Youn, **Gul Rahman***, Oh-Shim Joo, "Elucidation of the Structural and Charge Separation Properties of Titanium-doped Hematite Films Deposited by Electrospray Method for Photoelectrochemical Water Oxidation" **Electrochimica Acta** 297 **(2019)**784-793.
45. **Gul Rahman***, Mustifuz Rahman, Zainab Najab "In situ Synthesis of PANI/CuO Nanocomposites for Non-Enzymatic Electrochemical Glucose Sensing" **Applied Chemical Engineering**" 2 **(2019)**1.
46. Rizwan Ullah, Salma Bilal, Anwar Ul Haq Ali Shah, **Gul Rahman**, Khurshid Ali, "Ternary composites of polyaniline with polyvinyl alcohol and Cu by inverse emulsion polymerization: A comparative study" **Adv Polym Tech**. 37,**(2018)**, 3448-3459.
47. **Gul Rahman***, Chae Sang Youn, Oh-Shim Joo, "Efficient hydrogen evolution performance of phase-pure NiS electrocatalysts grown on fluorine-doped tin oxide-coated glass by facile chemical bath deposition" **Int. J. Hydrogen Energy** 43 **(2018)** 13022-13031.
48. **Gul Rahman***, Oh-Shim Joo, Chae Sang Youn, Anwar-ul-Ali Shah, Shabeer Ahmad Mian "Enhanced Water Oxidation Photoactivity of Nano-architectured α-Fe_2O_3-WO_3 Composite Synthesized by Single-step Hydrothermal Method" **Journal of Electronic Materials** 47 **(2018),** 2359-2365.
49. **Gul Rahman***, Shabeer Ahmad Mian "Recent trends in the development of electrochemical glucose biosensors" **International Journal of Biosensors & Bioelectronics**, 3 **(2017)**, 00051-00055.
50. Shabeer Ahmad Mian, Saleem Ul Azzam, **Gul Rahman**, Ijaz Ahmad "Density Functional Theory Study of Mussel Adhesive Protein (L-Dopa and Catechol) Cross-Linking" **MOJ Biorg Org Chem** 1(6) (**2017**),0037.
51. Anwar ul Haq Ali Shah, Muhammad Awais Khan, Salma Bilal, **Gul Rahman**, Hung, Van Hoang "Electrochemical co-deposition and characterization of polyaniline and manganese oxide nanofibrous composites for energy storage properties" **Advances in Polymer Technologies**, 37 (**2018)**, 2230-2237.
52. Ghulam Ali, **Gul Rahman**, Kyung Yoon Chung "Cobalt-doped pyrochlore-structured iron fluoride as a highly stable cathode material for lithium-ion batteries" **Electrochimica Acta**, 238 **(2017)** 49–55.
53. Anwar-ul-Haq Ali Shah, Nabila Yasmeen, **Gul Rahman**, Salma Bilal "High electrocatalytic behavior of Ni impregnated conducting polymer coated platinum and graphite electrodes for electrooxidation of methanol" **Electrochimica Acta**, 224 **(2017)** 468–474.
54. Shabeer Ahmad Mian, Muhammad Muzammal, **Gul Rahman***, Ijaz Ahmad, "The study of structural, elastic, electronic and optical properties of CsYxI(1-x)(Y=F, Cl, Br) using density functional theory" **Material Science Poland** 35 **(2017)** 197-210.
55. Shabeer Ahmad Mian, Younas Khan, Uzair Ahmad, Muhammad Adil Khan, **Gul Rahman**, Shahid Ali, "Investigating the adsorption mechanism of glycine in comparison with catechol on cristobalite surface using density functional theory for bio-adhesive materials" **RSC Advances**, 6 **(2016)** 114313-114319.
56. **Gul Rahman***, Shabeer Ahmad Mian, Anwar Ul Haq Ali Shah, Oh-Shim Joo "Electrocatalytic Behavior of Glassy Carbon Electrode Modified with Ruthenium Nanoparticles and Ruthenium Film" **J. Appl. Electrochem**. 46 **(2016)** 459–468.

57. Anwar-ul-Haq Ali Shah, Nabila Yasmeen, **Gul Rahman**, Mazhar Mehmood, Salma Bilal "Electrooxidation of Methanol at PANI/POAP Bilayered Structure Modified Platinum and Graphite Electrodes" **Electrochimica Acta**, 188 **(2016)** 367–377.
58. Ji Yeon Lim, **Gul Rahman**, Sang Youn Chae, Kwan-Young Lee, Chang-Soo Kim, Oh-Shim Joo, "Highly stable RuO_2/SnO_2 nanocomposites as anode electrocatalysts in PEM water electrolysis cell" **Int. J. Energy Research**, 38 **(2014)** 875–883.
59. ShoyebMohamad F. Shaikh, **Gul Rahman**, Rajaram S. Mane, and Oh-Shim Joo, "Bismuth Oxide Nanoplates-based Efficient DSSCs: Influence of ZnO Surface Passivation Layer" **Electrochimica Acta**, 111 **(2013)** 593–600.
60. **Gul Rahman**, Oh-Shim Joo, "Facile preparation of nanostructured α-Fe_2O_3 thin films with enhanced photoelectrochemical water splitting activity" **J. Mater. Chem. A**, 1 **(2013)** 5554–5561.
61. **Gul Rahman**, Oh-Shim Joo, "Electrodeposited nanostructured α-Fe_2O_3 thin films for solar water splitting: Influence of Pt doping on photoelectrochemical performance" **Materials Chemistry and Physics**, 140 **(2013)** 316 –322.
62. **Gul Rahman**, Oh-Shim Joo, "Photoelectrochemical water splitting at nanostructured α-Fe_2O_3 electrodes" **Int. J. Hydrogen Energy**, 37 **(2012)** 13989 – 13997.
63. Sikandar H. Tamboli, **Gul Rahman**, Oh-Shim Joo, "Influence of potential, deposition time and annealing temperature on photoelectrochemical properties of electrodeposited iron oxide thin films" **J. Alloys. Compd**., 520 **(2012)** 232-237.
64. **Gul Rahman**, Ji Yeon Lim, Kwang-Deog Jung, Oh-Shim Joo, "Electrodeposited Ru nanoparticles for electrochemical reduction of NAD^+ to NADH" **Int. J. Electrochem. Sci**., 6 **(2011)** 2789 – 2797.
65. **Gul Rahman**, Ji yeon Lim, Kwang-Deog Jung, Oh-Shim Joo, "NAD^+ hydrogenation on Au electrode deposited on modified glassy carbon" **Electrochemistry Communication**. 12 **(2010)** 1371–1374.
(* Corresponding Author)

Conferences, Symposiums & Invited talks

1. **Gul Rahman** " 7th Conference on Emerging Materials and Processes (CEMP-2026)" **Feb. 09-10, 2026**, School of Chemical & Materials Engineering, National University of Science & Technology (NUST), Islamabad, Pakistan **(Invited Speaker)**.
2. **Gul Rahman** "KIST Pakistan Alumni Research Symposium (KPARS-25)" **Oct. 01-02, 2025**, National University of Science and Technology (NUST), Islamabad, Pakistan **(Invited Speaker)**
3. **Gul Rahman** "7th ICS Spring Research Poster Symposium (SRPS7-2025)" **Feb. 20**, 2025, Institute of Chemical Sciences, University of Peshawar **(Organizer)**
4. **Gul Rahman** "KIST School Alumni Partnership Symposium in ASEAN-2023" **Dec. 01, 2023,** Sheraton Grand Jakarta Gandaria City Hotel, Jakarta, Indonesia **(Invited Speaker)**
5. **Gul Rahman** "KIST Pakistan Alumni Research Symposium (KPARS-23)" **Oct. 30-31, 2023**, National University of Science and Technology (NUST), Islamabad, Pakistan **(Invited Speaker)**
6. **Gul Rahman** "International School on Physics & Allied Disciplines (ISPAD-2022)" **March 14-18, 2022**, National Center for Physics, Islamabad, Pakistan. **(Invited Speaker).**
7. **Gul Rahman** "3rd International Conference on Environment and Sustainable Development (ICESD)", **Sep. 13-16, 2021**, Sustainable Development Study Center, Govt. College University,

Lahore, Pakistan (**Oral Talk**).

8. **Gul Rahman** "KIST-School Alumni Partnership Symposium ASEAN (KAPS-ASEAN 2019), Dec. 20-21, 2019, Hanoi Room, International Landmark 72 Tower, Hanoi, Vietnam **(Invited Speaker**).
9. **Gul Rahman**, INTERNATIONAL SYMPOSIUM ON ADVANCED ENERGY STORAGE MATERIALS (PU-AESM-219), **Nov. 04-06, 2019**, Department of Physics, University of the Punjab, Lahore, Pakistan (**Poster presentation**).
10. **Gul Rahman**, International Symposium on Advances in Chemistry (Polymer Science & Biomedical Materials) ISAC'19 (24th September – 26th September **2019**), Pakistan Institute of Engineering and Applied Sciences (PIEAS) Islamabad Pakistan (**Invited Speaker**).
11. **Gul Rahman**, International conference on chemical sciences: Recent trends in Chemical Sciences, Department of Chemistry, 24-26 April, **2019**, Quaid-i-Azam University Islamabad Pakistan (**Oral and Poster presentation**).
12. **Gul Rahman**, 1st International Symposium on Advanced Energy Materials: Production and Storage (ISAEM2018), June 25, **2018** IRCBM COMSATS, Lahore Pakistan **(Invited Speaker)**
13. **Gul Rahman**, Adil Akhtar, Science and Technology Poster Exhibition, 2nd and 3rd April, **2018**, National Center of Excellence in Physical Chemistry (NCEPC), University of Peshawar, Pakistan.
14. **Gul Rahman,** 1st International Conference on Emerging Trends in Material Sciences, 27th Feb to 1st March, **2018**, Center for Material Sciences, Islamia college Peshawar, Pakistan.
15. **Gul Rahman,** 2nd International Conference on "Impact of Nanoscience on Energy Technologies" Nano-SET 2017, October 25-27, COMSATS, Lahore. **(Oral Presentation).**
16. **Gul Rahman**, International Conference on Sustainable Energy Technologies, September 12-13, **2017**, Serena Hotel, Islamabad. **(Poster).**
17. **Gul Rahman**, National Conference on Green Energy Technologies, 18th May **2017** in Pearl Continental Peshawar, organized by USAID and Center for Advanced Studies in Energy, UET Peshawar. **(Poster).**
18. **Gul Rahman** "Introduction to solar energy technologies" in Home Economics College, University of Peshawar, Feb. 16, 2017. **(Invited talk).**
19. **Gul Rahman**, 3rd Conference on Sustainablility in Process Industry, SPI 2016, 19-20th October, 2016, University of Engineering and Technology Peshawar **(Oral Presentation).**
20. Mehmood Ali Khan, Anwar-ul-Haq Ali Shah, **Gul Rahman**, Synthesis, Characterization, and Application of Polyaniline/Tungsten Oxide Composite via in-situe Emulsion Polymerization; IMC/O-17, 27th National and 15th International Chemistry Conference, August 22-25, **2016**, Department of Chemistry, University of Malakand, Pakistan. **(Participation).**
21. 5th Spring Research Poster Exhibition, April 12, **2016**, Institute of Chemical Sciences, University of Peshawar **(Organizer).**
22. **Gul Rahman,** 5th Invention to Innovation Summit, 3-4 Nov, 2015, University of Haripur, Pakistan

23. Nanostructured α-Fe_2O_3 for solar hydrogen production, Nov. 13, **2014**, Center of Excellence in Physical Chemistry, University of Peshawar **(Oral Talk).**
24. Gul Rahman, Nanostructured materials for clean energy conversion, November **2013**, Yonsei University, Seoul, Republic of Korean **(Oral Presentation).**
25. **Gul Rahman**, Yun Jeong Hwang, Oh-Shim Joo, Electrospray-assisted Deposition and Characterization of Nanostructured α-Fe_2O_3 Thin Films for Photoelectrochemical Water Splitting; (B.1.4.14) Third International Conference on Multifunctional, Hybrid and Nanomaterials **2013**, 3-7 March, 2013, Sorrento (near Naples), Italy. **(Poster)**
26. PCCP-KCS symposium on Interfaces in Physical Chemistry, October **2012**, Seoul National University, Seoul Korea.
27. **Gul Rahman**, Oh-Shim Joo, Surfactant-templated electrodeposited hematite thin film as photoanode for photoelectrochemical water splitting; 26th Meeting of The Koean Electrochemical Society, April 12-14, **2012**, Kimdaejung Convention Center, Gwanju, Republic of Korea. **(Poster)**
28. **Gul Rahman**, Oh-Shim Joo, EC1282: Photoelectrochemical Characterization of Electrodeposited α-Fe_2O_3 Thin Films.; International Conference on Advanced Electromaterials, November 7-10, **2011**, Ramada Plaza Jeju Hotel, Republic of Korea **(Poster)**
29. Ji Yeon Lim, **Gul Rahman**, Kwan Young Lee, Kwang-Deog Jung, Oh-Shim Joo, NAD^+ hydrogenation on Ru modified glassy carbon electrode; 107th Meeting of The Koean Chemical Society, April 28-29, **2011**, International Convention Center Jeju (ICC), Jeju, Republic of Korea **(Poster)**
30. Thao Van Ta, **Gul Rahman,** Yong Hee Chung, Performance of DMFCs with Pt-Ru-W Anodes and Pt-Co Cathodes 101st Annual Meeting of the Korean Chemical Society, April 17-18, **2008**, Ilsan, Republic of Korea **(Poster)**
31. **Gul Rahman**, Asad Mehmood, Yong Hee Chung, Effect of Methanol Feed Rate in Direct Methanol Fuel Cells 103rd Annual Meeting of the Korean Chemical Society, April 16-17, **2009**, Seoul, Republic of Korea **(Poster)**
32. Global Warming & Chemistry Role; April **2008**, Hallym University, Chuncheon, South Korea **(Oral presentation)**.

Administrative tasks

1. Member (elected) of the Academic Council, University of Peshawar (2025- Current)
2. Member and Secretary of Research Ethics Board (REB), UOP (2024- Current)
3. Member of the Graduate Study Committee (GSC), Department of Chemistry, Shaheed Benazir Bhutto Women University, Peshawar (2023-current)
4. Departmental Scholarship Committee ICS, UOP (2023-2024)
5. Staff Proctor, ICS, UOP (2022-current)
6. Member of the Departmental Technical Review Committee (DTRC) (2022-current)
7. MS/M.Phil/PhD/Higher studies coordinator ICS, UOP (2020-2022)

8. BS admission committee member (2016-2019)
9. ICS conference organizing committee member (2018)
10. Pakistan Scottish Scholarship Focal person for University of Peshawar (2017-2018)
11. Prime minister Laptop Scheme (HEC) focal person (2016-2018, 2025)
12. BS Assistant Coordinator (2015-2018)

Scientific Society Membership

1. **Editorial board member** of the journal "Applied Chemical Engineering" from 2018 to 2022.
2. Member of Pakistan Chemical Society
3. Member of Korean Chemical Society
4. Member of Korean Electrochemical Society

Books and Book Chapters

1.**Book**: "Iron oxide-based Nanomaterials: From Fundamentals to Emerging Applications" ISBN: 9780443276743; Elsevier (Publishing stage).

2. **Book Chapter:** Noureen Amir Khan, **Gul Rahman***: Role of Carbon Nanomaterials in Energy Generation, Storage and Conversion; Book title "**Carbon-Based Nanomaterials**; Springer Nature Singapore Pte. Ltd. **2024**; ISBN 978-981-97-0240-4; https://doi.org/10.1007/978-981-97-0240-4.

3. **Book Chapter**: Noureen Amir Khan, **Gul Rahman***: "Nanomaterials in Anti-aging Cosmetics: Enhancing Skin Firmness and Elasticity" **Nanomaterials & Nanocomposites in in Cosmetic Products-Current Status, Future Prospects, Formulation, and Application**: Springer 2025 (Under publication)

4. **Book Chapter:** Sabawoon Gulzar, Zulikha Gulzar, **Gul Rahman***: "Zinc Nanoparticles: Various Methods of Synthesis, Characterization, and Properties" Zinc-Based Nanomaterials for Agricultural Practices: Sustainable Crop Growth, Production and Protection: **Taylor and Francis Group LLC 2025 (Under publication)**

5. **Book Chapter**: Sadiq Ur Rehman, Huma Gul, **Gul Rahman***: "Hydrogen Production Via Photocatalytic/Electrocatalytic Water Splitting" Electrochemical Pathways for Sustainable Energy and Resource Recovery: Fundamentals and Emerging Applications in Clean Energy and Circular Economy: Publisher: **Elsevier, 2026. ISBN: 9780443366260**

Professional Activities and Research Experience

Teaching

1. Advance Electrochemistry course (PhD)
2. Advance Chemical Kinetics and Surface Chemistry, Atomic Structure, Gases (M.Sc)
3. Molecular Symmetry, Electrochemistry, Nuclear Chemistry, and Photochemistry, Statistical Thermodynamics and Electrochemistry, Gases, Atomic Structure, Thermodynamics and Thermochemistry (B.S)
4. Laboratory Experiments (B.S): Conductometry, Potentiometric titrations; Polarimetry, Refractometry, Surface tension measurement, Viscometry, Spectrophotometry

Students Research Program Supervision

1. PhD students graduated= 01
2. PhD students enrolled= 4
3. M.Phil students graduated=20
4. M.Phil students working in Lab =12
5. B.S/M.Sc Supervised= 98
6. B.S students working in the lab = 14

M.S/M.Phil/Ph.D Thesis Evaluated of Other Universities

Total number of Thesis Evaluated = 44 (PhD =05; M.Phil = 25; BS = 18)

1. Shaheed Benazir Bhutto Women University, Peshawar Pakistan
2. National University of Science and Technology (NUST), Islamabad, Pakistan
3. Kohat University of Science and Technology (KUST), Pakistan
4. Bacha Khan University, Charsadda, KPK, Pakistan
5. Abdul Wali Khan University, Mardan, Pakistan
6. National Center of Excellence in Physical Chemistry, University of Peshawar, Pakistan
7. Sarhad University of Science & Information Technology, Peshawar, Pakistan

Academic and Research Activities

11/2013 – 07/2014: BK 21 Plus Post-doc Researcher (Yonsei University Seoul, Republic of Korea)

Project
PZT nanowires synthesized by MOCVD for piezoelectric energy harvesting and sensor applications

Supervisor
Yong Soo Cho, Ph.D.
Professor, Department of Materials Science & Engineering, College of Engineering, Yonsei University

Activities:
- Sputter deposition of various metal catalysts such as Ni and Pt on SiO_2/Si substrate
- MOCVD of PZT nanowires on catalyst modified SiO_2/Si substrate
- SEM analysis, XRD, EDX, and XPS characterization of the samples

2010 – Aug. 2013: Ph.D, Korea Institute of Science and Technology (KIST), Seoul, Republic of Korea; The University of Science and Technology (UST), Deajeon, Republic of Korea

Project 1
Photoelectrochemical water splitting using oxide semiconductor photoanodes for solar hydrogen production

Supervisor
Oh-Shim Joo, Ph.D.

Principle Research Scientist, Clean Energy Research Center, KIST

Activities:

- Preparation of oxide semiconductor thin films (α-Fe_2O_3, TiO_2, WO_3, $BiVO_4$, ZnO, Bi_2O_3 etc.) using various techniques such as Electrospray deposition, Electrodeposition, Hydrothermal synthesis, Chemical bath deposition, Sol-gel method, Spin coating and Screen printing for photoelectrochemical water splitting applications
- Material characterization using SEM, XRD, Raman, BET, TEM, XPS, electrochemical and Photoelectrochemical measurements (UV-visible spectra, CV, IV, IPCE, EIS, LV etc.)
- Photoelectrochemical cell (PEC) and dye-sensitized solar cell (DSSC)

fabrication and characterization

Project 2

Development of electrode materials for PEM water electrolyzer

Supervisor

Oh-Shim Joo, Ph.D.
Principle Research Scientist, Clean Energy Research Center, KIST

Activities:

- Synthesis of catalysts such as RuO_2 and IrO_2 by hydrothermal method
- Structural and morphotological characterization of the catalysts by SEM, XRD, TEM, and BET analysis
- Electrochemical characterization

Project 3

Electrochemical Reduction of NAD^+ on Au and Ru modified Glassy Carbon Electrodes

Supervisors

Oh-Shim Joo, Ph.D.
Principle Research Scientist, Clean Energy Research Center, KIST

Kwang-Deog Jung, Ph.D
Principle Research Scientist, Clean Energy Research Center, KIST

Activities:

- Preparation of Au and Ru nanoparticles on GC electrode by electrodeposition
- Morphology and electrochemical Characterization of the electrodes
- Electrolysis reaction of NAD^+ reduction on electrodes
- UV-Visible spectroscopic analysis of the products of electrolysis

Additional activities

Reviewing journal papers (Int. Journal of Hydrogen Energy), writing manuscripts and project reports, and participating in seminars and meetings

2008 – 2010: M.S, Department of Chemistry, Hallym University, Chuncheon, Republic of Korea

Project
Electrochemical reduction of CO_2 to methanol using binary and ternary electrocatalysts of RuO_2, IrO_2 and CoO_2 deposited on Ti substrate

Supervisor

Young Hee Chang, Ph.D

Professor, Department of Chemistry, Hallym University

Activities:

- Preparation of the electrodes
- Physicochemical characterization of the electrodes using SEM, XRD, and voltammetric techniques (CHI605B Electrochemical Analyzer)
- Analysis of the electrolysis solution by Gas Chromatography Mass Spectrometry (GCMS) and Solid Phase Micro Extraction (SPME).

Additional work: Pt electrode preparation on carbon paper for Direct Methanol Fuel Cell using plasma deposition technique (sputtering)

2005 – 2007: M.Sc, Department of Chemistry, Quaid-i-Azam University, Islamabad, Pakistan

Project 1
Cloud point determination and effect of different electrolytes on the cloud point of Triton X-100
Supervisor

Syed Sakhawat Shah, Ph.D

Professor, Department of Chemistry, Quaid-i-Azam University, Islamabad, Pakistan

Activities:

- Effect of concentration on the cloud point
- Effect of various salts (containing structure maker and structure breaker ions) on the cloud point of Trition X-100

Project 2
Voltametric study of Dinitrobenzene and its characterization
Supervisor

Romana Qureshi, Ph.D

Professor, Department of Chemistry, Quaid-i-Azam University, Islamabad, Pakistan

Activities:

- Cyclic voltammetry of Dinitrobenzene
- Determination of E_p, $E_{p/2}$, Ip, $E°$, diffusion coefficient D, and relationship between scan rate and I_p

Reviewer of International Journals

Materials Today Communications (Elsevier), Journal of Environmental Chemical Engineering (Elsevier), Small Methods (Wiley), Journal of Nanostructure in Chemistry (Springer), Environmental Research (Elsevier), Journal of Physical Chemistry (ACS), Surfaces (MDPI), Catalysis (MDPI), Coatings (MDPI), Energies (MDPI), Energy Materials (ACS), Fuel (MDPI),

Iranian Journal of Chemistry and Chemical Engineering, Materials (MDPI), Molecules (MDPI), Physical Chemistry Research (ICS), Process (MDPI), Sensors (MDPI), International Journal of Hydrogen Energy (Elsevier), Journal of Physical Chemistry C (ACS), , ACS Applied Energy Materials (ACS), Applied Surface Sciences (Elsevier), ACS Applied Nanomaterials (ACS), ACS Omega (ACS), Advance Materials Technologies (Wiley), Applied Ceramic Technology (Wiley), ChemElectroChem (Wiley), ChemistrySelect (Wiley), Energy Technology (Wiley), Fusion Science and Technology (Taylor & Fransic), Materials Chemistry Frontiers (RSC), Molecules (MDPI), Polymer (MDPI), Emerging Materials (Springer), Journal of Electroanalytic Chemistry (Elsevier), Materials Chemistry and Physics (Elsevier), Materials Science and Engineering B (Elsevier), Water (MDPI). NanoEnergy (Elsevier), Electrochimica Acta (Elsevier), Nanoscale (RSC), International Journal of Energy Research (Wiley), Journal of Applied Electrochemistry (Springer)

Research Collaboration:

1. Dr. Oh-Shim Joo, Principal Research Scientist, KIST, Seoul, Republic of Korea
2. Dr. Min Byoung Koun, Principal Research Scientist, KIST, Seoul, Republic of Korea
3. Sang Youn Chae, Ajou University, Suwon, Republic of Korea
4. Dr. Shabeer Ahmad Mian, Assistant Professor, Department of Physics, Islamia College University, Peshawar, Pakistan
5. Dr. Rajaram Sakharam Mane, Professor, Center for Nanomaterials and Energy Devices, Swami Ramanad Teerth Marathwada University, Dnyanteerth, Vishnupuri Nanded, India

Hands on Experience:

1. Gamry Potentiostate/Galvanostat (Model: Interface 1010B)
2. Metrohom Autolab (Nova 2.1.6)
3. CHI605B Electrochemical Analyzer
4. Potentiostat (Ivium Stat Technologies, Netherland), Interface1010E (Gamry)
5. XRD-6000, Shimadzu, Japan
6. Sun 2000 solar simulator, ABET Technologies, USA, EQE setup (1000 W Xenon lamp with monochromator: OrielCornerstone 130 1/8 m, 74 000)
7. BET (Bel sorpII, Japan)
8. UV-Visible spectrophotometer (Cary-5000, VARIAN)
9. SEM (JSM-6010LV JEOL)
10. Electrospinning/ spray system (NNC-ESP 200T)
11. Sputter (SNTEK Model: BSP5002)
12. CVD

Additional skills:

1. Operating Systems: Windows (XP, Vista, Windows 7, Windows 10)
2. Microsoft Office 2016
3. OriginPro 2016 for data analysis
4. Peakfit4 software for XPS data analysis
5. HighScore Plus for XRD fitting and refinement
6. Strong Communication and Presentation Skills

Extra-curricular Activities:

1. Regional Head of Pakistani Students Association Regional Head of Pakistani students of KIST, Korea University, Kokmin University and Kyunghee university Seoul (2013-2014) in Pakistani Student Association (PSA) South Korea
2. Playing Table tennis, badminton, Cricket
3. Volunteering
4. Participation in cultural activities

References:

1. Dr. Rasool Khan
Associate Professor, Institute of Chemical Sciences, University of Peshawar, Pakistan
Email: rasoolkhan@uop.edu.pk

2. Dr. Oh Shim Joo
Senior Research Scientist, KIST, Republic of Korea
Email: joocat@kist.re.kr