

Research Interests

- Graphene and Nanomaterials for Energy and Environmental Applications
- Photocatalysis and Water Remediation
- Gas Adsorption and Sensing Technologies
- Advanced Composite Materials for Solar Cells and Supercapacitors
- Material Science for Sustainable Energy Solutions

Skills

Research:

- Advanced materials synthesis, characterization, and application in energy and environmental fields.

Techniques:

- SEM.
- TEM.
- XPS.
- FTIR.
- Raman Spectroscopy.
- XRD.
- Electrochemical analysis.
- Gas adsorption.
- Photocatalytic testing.

Software:

- OriginLab.
- ChemDraw.
- MATLAB,

Languages

- English: Fluent (spoken and written)
- Urdu : Native
- Pashto : Fluent

Education

- **Ph.D. in Chemistry**
Pohang University of Science & Technology (POSTECH), South Korea | **2014**
(<https://chem.postech.ac.kr/EN/>)
- **M.Sc. in Chemistry**
Institute of Chemical Sciences, University of Peshawar, Pakistan | **2005**
(<http://www.uop.edu.pk/departments/?q=Institute-of-Chemical-Sciences>)

Academic Appointments Lecturer

- Institute of Chemical Sciences (ICS), University of Peshawar, Pakistan
(<http://www.uop.edu.pk/departments/?q=Institute-of-Chemical-Sciences>)
Lecturer | Mar 30, 2007 – Present
- Postdoc KNU South Korea (<https://en.knu.ac.kr/>)
Lecturer | 16 March 2015 -Dec 2015
- Frontier Model School & College, Peshawar, Pakistan
Lecturer | 2005 – 2007

Key Achievements and Contributions

- **Nobel Laureates Meeting:** Nominated by HEC Pakistan and selected to participate in the 59th Meeting of Nobel Laureates in Lindau, Germany (Chemistry), 2009.
- **NRPU(1) 2017 Grant Recipient:** Awarded funding for a project titled “*Graphene-based RE-doped PANI Nanofibres for Improved Photovoltaic Performance of Dye-Sensitized Solar Cells (DSSC)*”.
- **NRPU(2) 2017 Grant Recipient :** Co-PI of NRPU 2017 project entitled “*Self Assembled Sulfur Functionalized Graphene Oxides and Their Interaction with Thiol Network*”.
- **International Recognition:** Recipient of HEC Travel Grant for participation in GNN 2019 international conference at Bangkok, Thailand.
- **BK21 Fellowship:** Awarded by the Ministry of Education, South Korea, for outstanding Ph.D. performance.
- **Teaching Excellence:** Recognized for contributions to the academic growth of students, supervising multiple M.Phil., Ph.D., and M.Sc. projects in diverse interdisciplinary fields.
- **Publications:** Authored 27 peer-reviewed publications with a total impact factor of 130, covering topics in nanomaterials, energy, and environmental sustainability.
- Life member of the **Chemical Society of Pakistan**, since 2016.

Projects/ Award /Grants

- PI, “Graphene based RE-doped PANI nanofibers for improved photovoltaic performance of the dye sensitized solar cells (DSSC)” Project No. [7737/KPK/NRPU/R&D/HEC/2017](#), Grant: PKR. 3,866,403, Duration: 3 years, Sponsored by: Higher Education Commission (Pakistan).
- Co-PI, “Fabrication of Self Assembled Sulfur Functionalized Graphene Oxides and Their Interaction with Thiol Network” Project No. [9076/ KPK/NRPU/R&D/HEC/2017](#). Grant: PKR. 4,023,102. Duration: 3 years, Sponsored by: Higher Education Commission (Pakistan).

Book Chapters

- Water Remediation by G/GO-Based Photocatalyst. 2019. DOI: [10.5772/intechopen.85144](https://doi.org/10.5772/intechopen.85144).
- Controllable Growth and Application of BiOX Photocatalysis. 2025.
<https://doi.org/10.1016/B978-0-443-23861-1.00006-7>.

Publications

1. **Seema H., Fouzia K., Kamal T., Khan A., Kumar R., Patil A.** Facile Synthesis of RGO–PANI–Nd₂O₃ composite as an Efficient Platinum-Free Counter Electrode for Dye-Sensitized Solar Cells *Int. J. Electrochem. Sci.*, 2026,26(27),101391. DOI: <https://doi.org/10.1016/j.ijoes.2026.101391>
2. **Seema H., Fouzia K., Khan S., Licheng P., Sayyad M., Shahab A., Idris A.M.** Polyaniline- Cerium oxide (PANI-CeO₂) nanocomposite coated reduce graphene oxide for transparent films as counter electrodes for dye-sensitized solar cells. *Inorganic Chem Commun.*, 2025,181(1),115140.DOI: <https://doi.org/10.1016/j.inoche.2025.115140>
3. **Fouzia K., Seema H., A A., Khan S.,Shahab A.,Malik M.O., A Fahad.** A Novel Polyaniline Gadolinium Oxide Coated Reduced Graphene Oxide Nanocomposite: A Sustainable, Cost-Effective and High-Performance Counter Electrode for Dye-Sensitized Solar Cells. *Catalyst.*, 2026, 16(2),127. DOI: <https://doi.org/10.3390/catal16020127>
4. **Seema H., Fouzia K., Arbab K., Sayyad M.** Performance Evaluation of MXene and N-Doped MXene Counter Electrodes in DSSCs through J–V and Impedance Spectroscopic Analysis. *Mater. Sci. Eng. B.* 2025.323, 118890.<https://doi.org/10.1016/j.mseb.2025.118890>
5. **Othman M.H.D; Khan A.Ullah; Younas M; Seema H; Khan Z .** Nanomaterials as Key Drivers for Enhanced CO₂ Separation in Mixed Matrix Membranes. *J.Membr.Sci. Res.* 2025, e728387. <https://doi.org/10.22079/jmsr.2025.2047316.1692>
6. **Seema H; Arshad M; Maqbool A; Zeb S; Hamid A; Umar M; Hussain S; Khan H.** Sustainable wastewater treatment via nitrogen/sulfur co-doped graphene composite: Mechanistic insights & process optimization. *Journal of Water process engineering.* 2025, 68, 108701. <https://doi.org/10.1016/j.jwpe.2025.108701> .
7. **Zafar Z; Seema H; Rabbani M S; Li JP; Hou X; Yue XZ.** Highly sensitive ethanol sensor based on self-assembled BiVO₄ nanorod bundles. *J. Alloys Compd.*2025, 1013, 178625. DOI: [10.1016/j.jallcom.2025.178625](https://doi.org/10.1016/j.jallcom.2025.178625),
8. **Seema H., Zaman S.,Zahid M., Zafar Z.,Akitsu T.** Fabrication of green synthesized nickel-doped bismuth vanadate-based sensor for detecting ammonia at room temperature, Enhanced by DFT Investigations. *J. Indian Chem. Soc.*2025. <https://doi.org/10.1016/j.jics.2025.101700>
9. **Khattak SG., Safi MA., Shah M., Aziz A., Muhammad Y., Hassan H., Seema H.** Highly sensitive and selective PANI/Ag Nanocomposites-Based Gas sensors for room temperature ammonia detection. *Journal of Materials and applications*,2025,14(1),1-13. <https://doi.org/10.32732/jma.2025.14.1.1>
10. **Ali S., Seema H.,Khan Z., Din A., Hadi F.,Wang J.** The Nomenclature of Three Citrus Varieties Collected in Pakistan and Chemicals in Essential Oils from the Peels. *Pak. J. Bot.*, 2024, 56(2), 1-10. DOI: [http://dx.doi.org/10.30848/PJB2024-2\(24\)](http://dx.doi.org/10.30848/PJB2024-2(24))
11. **Seema H., Uddin S., Bibi S., Ali N., Almutairi T.M., Abdullah M.** Effect of Ca⁺² Doping on Microwave Dielectric Properties of BaTiO₃ Perovskites Ceramics. *Eur. Phys. J. Plus*, 2023, 138, 1089. DOI: <https://doi.org/10.1140/epjp/s13360-023-04748-x>.
12. **Seema H., Reshma, Zafar Z., Shah M.** Fabrication of Nanostructured V₂O₅ Decorated RGO-Polyaniline Sensor for Trace Level NH₃ Detection. *Journal of Material Science: Materials in Electronics*, 2023, 34, 1850. DOI: [10.1007/s10854-023-11280-2](https://doi.org/10.1007/s10854-023-11280-2).
13. **Seema H., Khan N., Shah A.H., Muhammad A.** Fabrication of Self-Assembled Prussian Blue Graphene Hydrogel for Highly Selective Removal of Radioactive Cesium in Water: Adsorption Study. *Materials Chemistry and Physics*, 2023, 306, 128003. DOI: <https://doi.org/10.1016/j.matchemphys.2023.128003>.
14. **Yaseen M., Subhan S., Khan K., Farooq M.U., Ahmed W., Seema H., Naz R., Subhan F.** Deep Desulfurization of Real Fuel Oils Over Tin-Impregnated Graphene Oxide-Hydrogen Peroxide and Formic Acid Catalyst-Oxidant System. *J of Sulphur Chemistry*, 2023, 44(2), 201-16. DOI: <https://doi.org/10.1080/17415993.2022.2131429>
15. **Seema H., Kemp K.C., Subhan S., Yaseen M.** Fabrication of Ni-MOF74 Derived Ni-Carbon Material for the Highly Efficient H₂ Gas Adsorption at Mild Operating Conditions. *International Journal of Hydrogen Energy*, 2022, 47(82), 34762-34772. DOI: <https://doi.org/10.1016/j.ijhydene.2022.08.091>.
16. **Khan N., Alam Khan, Seema H., Samreen A., Zeb B.** Fabrication of Graphene Oxide Coated Quartz Filter Paper for Enhanced Adsorption of Particulate Matter. *Applied Optics*, 2020, 59 (2), 463-8. DOI: [10.1364/AO.59.000463](https://doi.org/10.1364/AO.59.000463).
17. **Seema H., Zafar Z., Samreen A.** Evaluation of Solution-Processable Polymer Reduced Graphene Oxide Transparent Films as Counter Electrodes for Dye-Sensitized Solar Cells. *ARAB J Chem*, 2020, 13(4), 4978-86. DOI: <https://doi.org/10.1016/j.arabjc.2020.01.020>.

Publications

19. **Seema H.** Novel Self-Assembled Magnetic Prussian Blue Graphene-Based Aerogel for Highly Selective Removal of Radioactive Cesium in Water. ARAB J Chem, 2020, 13(2), 4417-24. DOI: <https://doi.org/10.1016/j.arabjc.2019.08.009>.
20. **Khan M., Yaseen Y., Seema H.** Extraction of Cd²⁺ from Model Aqueous Solution and Waste Tonner Carbon Using Polypropylene Supported Liquid Membrane and Na₂CO₃ as Strippant. ARAB J SCI ENG, 2019. DOI: [10.1007/s13369-019-03943-2](https://doi.org/10.1007/s13369-019-03943-2).
21. **Samreen A., Saher S., Shahid Ali, Seema H., Qamar A.** Effect of Hetero-Structured Nano-Particulate Coating on the Oxygen Surface Exchange Properties of La_{0.6}Sr_{0.4}Co_{0.2}Fe_{0.8}O_{3-δ}. Int. J. Hydrog. Energy, 2019, 44(12), 6223-8. DOI: [10.1016/j.ijhydene.2019.01.107](https://doi.org/10.1016/j.ijhydene.2019.01.107).
22. **Shaheen S., Kamran M., Ullah R., Seema H., Bilal S.** Synthesis of Soluble and Highly Thermally Stable Polyaniline-Titanium Dioxide Composite via Inverse Emulsion Polymerization. J Chem Soc Pak, 2019, 41(6), 921-31.
23. **Shirinfar B., Seema H., Ahmed N.** Charged Probes: Turn-On Selective Fluorescence for RNA. Org. Biomol. Chem, 2018, 16, 164-8. DOI: [10.1039/C7OB02423A](https://doi.org/10.1039/C7OB02423A).
24. **Seema H., Shirinfar B., Shi G., Youn I., Ahmed N.** Facile Synthesis of Selective Biomolecule Chemosensor and Fabrication of Its Highly Fluorescent Graphene Complex. The Journal of Physical Chemistry B, 2017, 121(19), 5007-16.
25. **Shi G., Gadhe C.G., Park S.W., Kim K.S., Kang J., Seema H., Singh N.J., Cho S.J.** Ionophores with 2n-Crown-n Topology: Anion Sensing via Aliphatic C-H...A-Hydrogen Bonding. Organic Letters, 2014, 16(2), 334-7. DOI: [org/10.1021/ol402819m](https://doi.org/10.1021/ol402819m).
26. **Seema H., Kemp C., Le N.H., Kim K.S.** Highly Selective CO₂ Capture by S-doped Microporous Carbon Materials. Carbon, 2014, 66, 320-6. DOI: [10.1016/j.carbon.2013.09.006](https://doi.org/10.1016/j.carbon.2013.09.006).
27. **Le N.H., Seema H., Kemp K.C., Ahmed N., Tiwari J., Park S., Kim K.S.** Highly Conductive and Solution-Processable Micro-Hydrogels of Nanoparticle/Graphene Platelets Produced by Reversible Self-Assembly and Aqueous Exfoliation. Journal of Materials Chemistry A, 2013, 1(41), 12900-8. DOI: [10.1039/C3TA12735D](https://doi.org/10.1039/C3TA12735D).
28. **Kemp K. C., Seema H., Saleh M., Le N.H., Mahesh K., Chandra V., Kim K.S.** Environmental Applications Using Graphene Composites: Water Remediation and Gas Adsorption. Nanoscale, 2013, 5 (8), 3149-71. DOI: [10.1039/c3nr33708a](https://doi.org/10.1039/c3nr33708a).
29. **Seema H., Kemp K.C., Chandra V., Kim K.S.** Graphene-SnO₂ Composites for Highly Efficient Photocatalytic Degradation of Methylene Blue under Sunlight. Nanotechnology, 2012, 23 (35), 355705-12. DOI: [10.1088/0957-4484/23/35/355705](https://doi.org/10.1088/0957-4484/23/35/355705).

National Publications

- 1 **Seema H.**, Auto-Combustion Synthesis and Characterization of Multi-Ferroic (BiFeO₃) Materials. JPMS conference issue, Materials, 2010, 12-18.

Journal proceedings

- 1 **Shahzad A., Seema H., Miran W., Kadam A.A., Nawaz M., Jang J., Lee D. S.** Removal of Heavy Metals by Novel EDTA Functionalized Magnetic Chitosan Graphene Oxide Nanocomposite. Korean Society of Environmental Engineers (KSEE), 2015, 599-600
- 2 **Kadam AA., Seema H., Lee DS.** Radioactive cesium removal from aqueous solution using pectin stabilized magnetic graphene oxide prussian blue nanomaterials. Korean Society of Environmental Engineers (KSEE), 2015, 332-333.
- 3 **Jang J., Seema H., Kadam A., Shin S., Heo J., Kim D., Moshin N., Waheed M., Lee D S.** Magnetic Prussian blue nanocomposites for removal of radioactive cesium in water, Korean Society of Environmental Engineers, 2015, 709-710

Conferences and Workshops

- **GNN 2019:** Attended and presented research at the Global Nanoscience & Nanotechnology Conference, Bangkok, Thailand, and July 8-11, 2019.
- **59th Nobel Laureates Meeting:** Selected participant in the prestigious meeting of Nobel Laureates in Chemistry, Lindau, Germany, 2009.
- **The Second Chem. Comm. International Symposium on Supramolecular Chemistry**, Nov 17, 2010, Korea.
- EPB workshop, **Center for Electro-Photo Behavior in Advance Molecular System**, Jan 6- 8, 2011, Korea.
- AMS Mini-Symposium “**Frontiers in Supramolecular and Material Chemistry**”, Oct. 26, 2011, POSTECH, Korea.
- International Workshop on **Post-Fukushima Challenges in Nuclear Safety and Environmental, Contamination**, June 4-5, 2012, Korea.
- POSTECH International Symposium on **Bio-imaging**, Nov, 1-2, 2012, Korea.
- **The Symposium/workshop of Computational Science (SWOCS)**, Nov 17, 2012. POSTECH, Korea.
- 1st National Conference on “**Materials processing, characterization, properties and their economic potentials-2010**” University of Peshawar, KPK, Pakistan.
- **National Conference-2010** at Baragali summer campus, KPK, Pakistan.
- **First Spring Research Poster Symposium- 2010** at ICS, University of Peshawar, KPK, Pakistan.
- Symposium on **recent trends in indigenous chemical research and awareness on data presentation skills**”- July, 2009 at ICS, University of Peshawar, KPK, Pakistan.
- Training program on “**Research methodology and scientific writing of manuscripts**”, 24-26th Feb 2016.
- “**ISESCO women in Science Conference:** Contribution of Pakistani women in scientific and social development” at Quaid-i-Azam University, Islamabad, Pakistan, 08th March, 2016.
- “**27th National and 15th International chemistry conference** at department of chemistry, University of Malakand, 22-25 Aug, 2016.
- Workshop on **Method, Data Analysis and Referencing** at Baragali summer campus (18th - 22nd June 2021).
- Workshop on **Synthesis and applications: Membrane technology** at Dept. of Chemical engineering, UET, Peshawar (17th Mar, 2023)
- 6th International conference on **Sustainability In Process Industry SPI-2022** at GIKI-Top Swabi (Oct 19-20th, 2022)
- **Pak- China GIKI-SU “2023 International Conference On Advances In Emerging Solar Cell Technologies, Photonics, Multidisciplinary Science & Engineering, Undergraduate Research, And Photonics Exhibition” at GIKI-Top Swabi (March 14-17th, 2023)**
- Workshop on **Capacity Building Of Researchers, Academic And Informational Professionals** at Baragali Summer Camp (July 07-09 2023)
- 1st international women conference “**Breaking Barriers, Building Bridges: Uniting Women’s Voices for a Better World**” at Serena Hotel, Peshawar (4-5 Dec, 2023)
- National training workshop on **Modern trends in Research and Information Management: Tools and Techniques**. Baragali Summer Campus. (11-13 July 2025)

References

- Dr Rasool Khan (Head of Department), rasoolkhan@uop.edu.pk
- Dr Waseem Hassan (Associate Prof. & Head of inorganic chemistry section), waseem_anw@yahoo.com
- Dr Nauman Ali (Associate professor), nali75pk@uop.edu.pk