

Personal Information

Mutabar Shah

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Academic Qualifications

Degree obtained

Institution

Ph.D.

Engineering Sciences (Applied Physics)

Ghulam Ishaq Khan Institute of Engineering Sciences & Technology,
Topi, Swabi, Khyber Pakhtunkhwa, Pakistan.

M.S./M.Phil.

Engineering Sciences (Applied Physics)

Ghulam Ishaq Khan Institute of Engineering Sciences & Technology,
Topi, Swabi, Khyber Pakhtunkhwa, Pakistan.

M. Sc.

Physics

Department of Physics
University of Peshawar, Pakistan

Teaching Experience

(11-04-2011

to

29-01-2024)

Assistant Professor

Department of Physics
University of Peshawar, Pakistan

30-01-2024

until today

Associate Professor

Department of Physics
University of Peshawar, Pakistan

Research Interest

- Organic semiconducting materials and their electronic/optoelectronic applications
- Schottky diodes and metal–semiconductor interfaces for electronic devices
- Humidity, gas, and light sensing technologies based on functional materials
- Synthesis, characterization, and applications of nanoparticles in Nanotechnology
- Emerging applications of advanced materials, including photovoltaic and renewable energy technologies, energy storage systems (batteries), neuromorphic devices, and advanced photodetectors

Research Projects and Grants

1. Higher Education Commission of Pakistan (Start-Up Research Grant Program IPFP) project. **(PI)**
Title: Characterization of organic semiconductor based thin film devices.
2. **Higher Education Commission of Pakistan (CO – PI).**
Title: Thermochemical ion-exchange of metal nanoparticles in silicate glasses for optical devices and integrated optics.
3. **Higher education commission of Pakistan (PI).**
Title: Fabrication and characterization of thin film based organic electronic devices.
4. **Higher education commission of Pakistan (Co-PI).**
Title: Fabrication of noble metal decorated metal oxide-based sensor for monitoring of human breath biomarkers”. **(In Progress)**

Supervisory experience

Ph,D.	Supervised:	05
MPhil	Supervised:	30

Publications

- (1) K Malook, H Khan, M Shah, IU Haque, A Ahmad, “Fabrication of Au-decorated V₂O₅ based sensor for ultra trace level detection of ammonia in an environment resembling human exhaled breath”, *Journal of Alloys and Compounds* 1010, 2025, 177089.
- (2) A Aziz, M Shah, SG Khattak, Y Muhammad, H Hassan, “ High-performance and sensitive humidity sensors based on reduced Graphene Oxide/Nickel Ferrite nanocomposites”, *Materials Science and Engineering: B* 307, 2024, 117519.
- (3) MA Safi, M Shah, M Iftikhar, HA Tajik, A Jan, KA Shah, I Haq, S Rahim, “ High-sensitivity and low-hysteresis humidity sensor based on reduced graphene oxide/zinc oxide nanocomposites” *Emergent Materials*, [volume, 2024](#), 1-9
- (4) Inayat ullah , Mutabar Shah , Jamshid Khan , Muhammad Sajjad , Mohsin Kazi , Khalid Hussain Thebo, “Methylene blue-based multifunctional sensor for sensitive detection of organic solvents and gases”, *Journal of Physics and Chemistry of Solids* 189, 2024, 111945.
- (5) Yaseen Muhammad, M Shah, MA Safi, SG Khattak, A Aziz, H Hassan, “ Highly selective and sensitive humidity sensor using reduced graphene oxide based iron oxide nanocomposites” *Materials Science and Engineering: B* 303, 2024, 117324.
- (6) Muhammad Asim Safi, Mutabar Shah, “Study the effect of ZnO additive in rGO/ZnO nanocomposites for the investigation of ammonia sensing characteristics”, *Materials Science and Engineering: B*, 299, 2024, 116999.
- (7) Humaira Seema, Reshma, Zaiba Zafar, Mutabar Shah, “Fabrication of nanostructured V₂O₅ decorated RGO-polyaniline sensor for trace level NH₃ detection”, *Journal of Materials Science: Materials in Electronics*, 34(27), 2023, 1850.
- (8) Yousaf Ali Shah, Mutabar Shah, Khan Malook, Afzal Khan & Muhammad Ali, “Fabrication and characterizations of ultra-sensitive capacitive/resistive humidity sensor based on CNT-epoxy nanocomposites”, *Journal of Material Science*, 58 (45), 2023, 17211-17224
- (9) Ishrat Rahim, M Shah, A khan, R Ullah, “ Synthesis, characterization and fabrication of highly efficient chemical sensor based on Graphene Nanocomposites” *Iranian Journal of Science* 47 (4), 2023, 1431-1440
- (10) T Ali, M Shah, “ Processing and optical characterization of ultra-sensitive humidity and pressure sensors based on polyaniline/holmium oxide hybrid nanocomposites”, *Sensors and Actuators A: Physical* 331, 2021, 113040.
- (11) Hizb Ullah Khan, Muhammad Tariq, Mutabar Shah, Mahmood Iqbal, Inam

- Ullah, Muhammad Haris Mehmood, Shafi Ur Rahman, Abdur Rahim,”Exploring the NH₃ gas sensing efficiency of polyvinylpyrrolidone based tungsten trioxide (PVP/WO₃) Nanocomposites: A recent progression in the toxic gas sensing materials”, Materials Science and Engineering: B 273, 2021,115422.
- (12) HU Khan, M Tariq, M Shah, S Ullah, AR Ahsan, A Rahim, J Iqbal, “Designing and development of polyvinylpyrrolidone-tungsten trioxide (PVP-WO₃) nanocomposite conducting film for highly sensitive, stable, and room temperature humidity sensing”, Materials Science in Semiconductor Processing 134, 2021, 106053.
- (13) HU Khan, M Tariq, M Shah, M Iqbal, MT Jan,” Inquest of highly sensitive, selective and stable ammonia (NH₃) gas sensor: Structural, morphological and gas sensing properties of polyvinylpyrrolidone (PVP)/CuO nanocomposite”, Synthetic Metals 268, 2020, 116482.
- (14) K Malook, H Khan, M Shah, “Ammonia sensing behavior of polypyrrole-bimetallic oxide composites”, Polymer Composites 41 (7), 2610-2615.
- (15) HU Khan, M Tariq, M Shah, MT Jan, M Iqbal, J Khan, AR Ahsan, A Rahim, “The efficacy of polyvinylpyrrolidone (PVP)/CuO nanocomposite as an appropriate room temperature humidity sensing material: fabrication of highly sensitive capacitive resistive type humidity sensor”, Journal of Materials Science: Materials in Electronics 31 (10), 2020, 7698-7707.
- (16) Hamayun Khan, Khan Malook, Mutabar Shah, “Synthesis, characterization and electrical properties of polypyrrole/bimetallic oxide composites”, Journal of Applied Polymer Science, Volume, 137, 2020, 47680.
- (17) Hizb Ullah Khan, Muhammad Tariq Jan, Mahmood Iqbal, Mutabar Shah, Inam Ullah, Jehangeer Khan, Kalsoom Mahmood, Abdul Niaz and Muhammad Tariq, “Synthesis, Characterization and Electrical Conductivity of Silver Doped Polyvinyl Acetate/Graphene Nanocomposites: A Novel Humidity Sensor” , Zeitschrift für Physikalische Chemie 234 (1), 2020, 27-43.
- (18) M. S. Shifa, A.misbah, T. Munir, A. Shahzad, M. N. Usmani, M. Khalid, S. Mutabar, Q. Imdadullah, Z. A. Gilani, H. M. N. Ul huda khan asghar “ characterization of zirconium substituted cobalt zinc ferrites synthesized via

- co-precipitation technique” , Digest Journal of Nanomaterials and Biostructures, 14(3), 2019, 607-616.
- (19) Mutabar Shah, Kashif Anwar, Rasool khan, “Humidity and temperature sensing properties of 2-{{(Z)-[1-(ethoxycarbonyl)-2-oxopropyl]diazenyl}}benzoic acid”, **Materials Research Express**, 6 (2019) 125916.
 - (20) Mutabar Shah, Noman Khan, Zahid Imran, Masood Khan, Abraiz Khattak, Adam Khan and Niamat Ullah, “Structural, optical and impedance spectroscopy study of thin film of polyaniline (PANI/ZnO) nanocomposite ”, *Materials Research Express*, 7 (1), 2019, 015314.
 - (21) Ishrat Rahim, Mutabar Shah, Afzal Khan, Fazal Wahab and Mahmood Iqbal, “Comparative study of microstructural and humidity sensing properties of graphene based nanocomposite thin film”, *Measurement Science and Technology*, *Measurement Science and Technology* 31 (3), 2019, 035104
 - (22) I Ullah, M Shah, SA Khattak, G Khan, “Temperature Effect on Electronic Parameters of CuPc/n-Si Heterojunction”, *Journal of Electronic Materials* 48 (9), 2019, 5609-5616.
 - (23) K Malook, H Khan, M Shah, IU Haque, “Highly selective and sensitive response of Polypyrrole–MnO₂ based composites towards ammonia gas”, *Polymer Composites* 40 (4), 2019, 1676-1683
 - (24) Ishrat Rahim , Mutabar Shah , Mahmood Iqbal and Afzal khan, “Synthesis, structural, optical, morphological and multi sensing properties of graphene based thin film devices” *Material Research Express*, 5, 2018, 096403
 - (25) Hamayun Khan, Khan Malook and Mutabar Shah, "Polypyrrole/MnO₂ composites: Synthesis, structural and electrical properties", *Journal of Materials Science: Materials in Electronics*, 29 (11), 2018 , 9090-9098
 - (26) Ishrat Rahim, Mutabar Shah, Afzal khan, Jingting Luo, * Aihua Zhong, Min Li, Rashid Ahmed, Honglang Li , Qiuping Wei , Yongqing Fu, “Capacitive and resistive response of humidity sensors based on graphene decorated by PMMA and silver nanoparticles”, *Sensors and actuator* ,267, 2018, 42-50
 - (27) Khan Malook, Hamayun Khan, Mutabar Shah, and Ihsan-Ul-Haque, “Synthesis, characterization and electrical properties of polypyrrole/V₂O₅ composites”, *Korean J. Chem. Eng.*, 35(1), 2018, 12-19.
 - (28) Ishrat Rahim, **Mutabar Shah**, Mahmood Iqbal, Fazal Wahab, Afzal Khan, Shah Haider Khan, “Fabrication and electrical characterizations of graphene

- nanocomposite thin film based heterojunction diode ", Physica B, 524, 2017, 97–103.
- (29) Hamayun Khan, Khan Malook, **Mutabar Shah**, "Highly selective and sensitive ammonia sensor using polypyrrole/V₂O₅ composites", J Mater Sci: Mater Electron, 28, 2017, 13873-13879.
 - (30) Zubair Ahmad, Farid Touati, Qayyum Zafar, **Mutabar Shah**, " Integrated Capacitive and Resistive Humidity Transduction via Surface Type Nickel Phthalocyanine Based Sensor", International Journal of Electrochemical science, Vol. 12, 2017, 3012 – 3019.
 - (31) Irfan Ullah, **Mutabar Shah**, Majid Khan, "Consistency in Al/CuPc/n-Si Heterojunction Diode Parameters Extracted Using Different Techniques". Journal of Electronic Materials, Vol. 45 (2), 2016, 1175-1183.
 - (32) N. Ali, S. Ajmal, **Mutabar Shah**, R. Ahmed, Bakhtiar ul haq, Amiruddin shaari, " Effect of antimony variation on the physical properties of thermally deposited SnS thin films" Chalcogenide Letters, Vol. 11(10), 2014, pp: 503 – 508.
 - (33) N. Ali, R. Ahmad, A. Shaari, I. Rahim, **Mutabar Shah**, A. Hussain, N. Ahmad and S. M. Abbas" Annealing effects on the structural and optical properties of thermally deposited Tin Antimony Sulfide thin films", Brazilian Journal of Physics, Vol. 44, 2014, pp. 744-738.
 - (34) Adam Khan, Kh. S. Karimov, Z. Ahmad, K. Sulaiman, **Mutabar Shah** and S. A. Moiz, " Pressure sensitive organic sensor based on CNT-VO (3fl) composite", Sains Malaysiana, Vol. 43 (6), 2014, p: 903 – 908.
 - (35) N. Ali, A. Hussain, S. T. Hussain, M. A. Iqbal, **Mutabar Shah**, I. Rahim, N. Ahmad, Z. Ali, K. Hutching, D. Lane and W. A. A. Syed, "Physical Properties of the Absorber Layer Sn₂Sb₂S₅ thin Films for Photovoltaics", Current Nanoscience ,Vol. 9, 2013. pp: 149-152.
 - (36) A. Khan, Kh. S. Karimov and **Mutabar Shah**, "Resistance Pressure Sensor Based on Ag/Cu₂O-PEPC-NiPc/Al Composite", Key Engineering Materials, Vol. 510-511, 2012, pp: 413-419
 - (37) Mutabar Shah, Zubair Ahmad, K. Sulaiman, Kh. S. Karimov, M.H. Sayyad, "Carbon nanotubes' nanocomposite in humidity sensors", Solid-State Electronics, Vol. 69, 2012, pp: 18-21
 - (38) Fahrettin Yakuphanoglu, **Mutabar Shah**, W. Aslam Farooq, "Electrical and

- interfacial properties and formation of a Schottky barrier at p-Si/P3HT hybrid junction”, *Acta Physica Polonica A*, Vol. 120, 2011, pp: 558-562.
- (39) **Mutabar Shah**, M. H. Sayyad, Kh. S. Karimov, “Electrical characterization of the organic semiconductor Ag/CuPc/Al Schottky diode”, *Journal of Semiconductor*, Vol. 32 (4), 2011, pp: 044001-5.
- (40) M. Tariq Saeed, F. A. Khalid, Kh. S. Karimov, **Mutabar Shah**, “Organic Cu/cellulose/PEPC/Cu humidity sensor”, *Optoelectronics and advanced materials-rapid communication*, Vol. 4 (6), 2010, pp: 888-892.
- (41) Kh. S. Karimov, M. Saleem, **Mutabar Shah**, S. Shafique, “Investigation of rectenna for microwave power conversion”, *Advances in Natural Sciences: Nanoscience and Nanotechnology*, Vol. 1, 2010, pp:035002-5.
- (42) **Mutabar Shah**, M. H. Sayyad, Kh. S. Karimov, Fazal Wahab, “Electrical characterization of the ITO/NiPc/PEDOT:PSS junction diode”, *Journal of Physics D: Applied Physics*, Vol. 43, 21st Sep. 2010, pp: 405104-5.
- (43) **Mutabar Shah**, Kh. S. Karimov, Z. Ahmad, M. H. Sayyad, “Electrical characteristics of Al/CNT/NiPc/PEPC/Ag surface-type Cell”, *Chinese Physics Letter*, Vol. 27, No. 10, 2010, pp: 106102-4
- (44) **Mutabar Shah**, Kh. S. Karimov, M. H. Sayyad, “Organic semiconductor nickel phthalocyanine based photocapacitive and photoresistive detector”, *Semiconductor Science and Technology*, Vol. 25, No. 07, 29th June 2010, pp: 075014-075019
- (45) Z. Ahmad, M. H. Sayyad, M. Saleem, Kh. S. Karimov, **Mutabar Shah**, “Frequency dependent electrical characteristics of Au/n-Si/CuPc/Au heterojunction”, *Acta Physica Polonica A*, Vol. 117, No. 3, March 2010, pp: 493-496.
- (46) **Mutabar Shah**, M. H. Sayyad, Kh. S. Karimov, M. M. Tahir, “Investigation of the electrical properties of a surface-type Al/NiPc/Ag Schottky diode using I–V and C–V characteristics”, *Physica B: Condensed Matter*, Vol. 405, Issue 4, 15 February 2010, pp: 1188-1192.
- (47) **Mutabar Shah**, M. H. Sayyad, Kh. S. Karimov, M. M. Tahir, “Fabrication and electrical characterization of the surface-type Au/NiPc/Ag diode”, *Optoelectronics and Advanced Materials-Rapid Communications*, Vol. 3, No. 8, July 2009, pp: 831-834.
- (48) M. H. Sayyad, **Mutabar Shah**, Kh. S. Karimov, Z. Ahmad, M. Saleem, M.

- M. Tahir, "Fabrication and study of NiPc thin film based surface type photocapacitors", Journal of Optoelectronics and Advanced Materials, Vol. 10, No. 10, October 2008, pp: 2805-2810.
- (49) Z. Ahmad, M. H. Sayyad, M. Saleem, Kh. S. Karimov, **Mutabar Shah**, "Humidity dependent characteristics of methyl-red thin film based Ag/methyl-red/Ag surface type cell", Physica E, Vol. 41, Issue 1, October 2008, pp: 18-22.
- (50) M. Saleem, M. H. Sayyad, Kh. S. Karimov, Z. Ahmad, **Mutabar Shah**, M. Yaseen, I. Khokhar, M. Ali, "Synthesis and photocapacitive studies of Cu(II) 5,10,15,20-tetrakis(4-isopropylphenyl) porphyrin", Journal of Optoelectronics and Advanced Materials, Vol. 10, No. 6, June 2008, pp: 1468-1472.

International Conference Papers

- 1 M. H. Sayyad, Kh. S. Karimov, M. Saleem, Z. Ahmad, **Mutabar Shah**, M. M. Tahir, M. Yaseen, M. Ali, "Study of the humidity, light and temperature dependent electrical properties of organic semiconducting materials", Poster presentation in Taibah International Chemistry Conference, March 23-25, 2009, Saudi Arabia.
- 2 **Mutabar Shah**, M. H. Sayyad, Kh. S. Karimov, "Fabrication and study of nickel phthalocyanine based surface-type capacitive sensors", Proceedings of World Academy of Science, Engineering and Technology (PWASET), Vol. 43, 2008, pp: 392-394, Germany.
- 3 Kh. S. Karimov, M. H. Sayyad, A. Fauzi, K. Y. Cheong, M. M. Tahir, **Mutabar Shah**, "Ag/NiPc/Ag humidity sensor for environmental monitoring", Proc. 6th International Materials Technology Conference & Exhibition, 24-27 August 2008, Kuala Lumpur, Malaysia.
- 4 Z. Ahmad, M. H. Sayyad, Kh. S. Karimov, M. Saleem, **Mutabar Shah**, "Electrical characterization of Al/methyl-red/Ag Schottky diode", 6th International Conference on Electrical Engineering (ICEENG), 2008, Cairo, Egypt.
- 5 M. H. Sayyad, M. Saleem, Kh. S. Karimov, Z. Ahmad, **Mutabar Shah**, M. Yaseen, I. Khokhar, M. Ali, "Cu(II) 5,10,15,20-tetrakis(4-isopropylphenyl)

porphyrin based photo capacitive Detectors”, 6th International Conference on Electrical Engineering (ICEENG), 2008, Cairo, Egypt.

6. M. H. Sayyad, M. Saleem, **Mutabar Shah**, N. M. Shaikh, M. A. Baig, “Laser-Induced Breakdown Spectroscopy of different brands of cigarettes in Pakistan”, AIP Conference Proceedings, Volume 1017, pp. 363-367 (2008), National Physics Conference (PERFIK) 2007, Malaysia.
7. M. Saleem, M. H. Sayyad, Z. Ahmad, Kh. S. Karimov, **Mutabar Shah**, “Study of frequency effect on the interface traps density and series resistance of Au/n-Si/CuPc/Au heterostructure”, AIP Conference Proceedings, Volume 1017, pp. 84-88 (2008), National Physics Conference (PERFIK) 2007, Malaysia.