

# Dr. Farhan Mumtaz

Assistant Research Professor | IEEE Senior Member  
Department of Electrical and Computer Engineering  
Missouri University of Science and Technology

227 (Office) / G24A (Lab) Emerson Electric Hall, 16th St, Rolla, MO 65409, USA

✉ [mfmawan@yahoo.com](mailto:mfmawan@yahoo.com) ✉ [mfmawan@mst.edu](mailto:mfmawan@mst.edu) ☎ +1-573-647-3681 🌐 [farhanmumtaz.com](http://farhanmumtaz.com)

Status: U.S. Permanent Resident (Green Card)

## EDUCATION

|                  |                                                                                                                    |
|------------------|--------------------------------------------------------------------------------------------------------------------|
| <b>2021–2022</b> | Post-Doctorate, Electrical and Computer Engineering, Missouri University of Science and Technology, Rolla, MO, USA |
| <b>2018–2021</b> | Ph.D., Information and Communication Engineering, Wuhan University of Technology, Hubei, China                     |
| <b>2016–2018</b> | M.Phil., Electronics, Quaid-i-Azam University, Islamabad, Pakistan                                                 |
| <b>2013–2015</b> | M.Sc., Electronics, Preston University Kohat (Islamabad Campus), Pakistan                                          |
| <b>2007–2009</b> | MBA, Management Sciences, Sarhad University of Science and IT, Peshawar (Islamabad Campus), Pakistan               |
| <b>2004–2006</b> | B.Sc., Mathematics & Physics, University of Punjab, Lahore, Pakistan                                               |

## PROFESSIONAL EXPERIENCE

|                        |                                                                                                          |
|------------------------|----------------------------------------------------------------------------------------------------------|
| <b>01/2023–Present</b> | Assistant Research Professor / R&D Expert, Missouri University of Science and Technology, Rolla, MO, USA |
| <b>12/2021–12/2022</b> | Research Scientist / R&D Expert, Missouri University of Science and Technology, Rolla, MO, USA           |
| <b>09/2018–11/2021</b> | Research Assistant, Wuhan University of Technology, Hubei, China                                         |
| <b>01/2016–11/2021</b> | Teaching & Research Assistant, Quaid-i-Azam University, Islamabad, Pakistan                              |
| <b>12/2014–10/2015</b> | Senior Manager, Service Solution Sales, Huawei Technologies, Islamabad, Pakistan                         |
| <b>06/2012–11/2014</b> | Project Manager, Delivery Service & Rollout, Huawei Technologies, Islamabad, Pakistan                    |
| <b>01/2007–05/2012</b> | Plan Control Manager, Delivery Service & Rollout, Huawei Technologies, Islamabad, Pakistan               |

## RESEARCH INTERESTS

- Fiber-optic sensing and photonic devices in extreme environments
- Advanced Micro/Nano-fabrication and Materials for Photonics
- Femtosecond Laser Micromachining/wafer-level fabrication and Optical Waveguide Devices
- Fiber Bragg Gratings and Distributed Optical Fiber Sensors
- Optical Chemical and Biosensing based on Fiber SPR and MOF Sensors
- High-speed interconnects (e.g., 400G/800G) and photonic integration
- Industry experience in telecom, network systems, and hardware solutions

## HONORS & AWARDS

- Top 2% Scientist in Optoelectronics & Photonics, 2024, 2025  
(*Stanford University & Elsevier Database*)
- Panel Reviewer, *Steel Research International*, WILEY, 2025
- **IEEE Senior Member Award**, 2024
- Featured Articles in *AISTech Transactions* and *Iron & Steel Technology Magazine*, 2023–2024
- SPIE-COMSOL Multiphysics Excellent Trainer Award, Quaid-i-Azam University, 2021

- IEEE Best Poster Award, ICOCN, 2019
- MOFCOM Fully Funded PhD Scholarship, 2018
- Keynote Speaker, Belt and Road Countries Conference, BICC, Beijing, China, 2017
- Long-Term Service Excellence Award, 2015
- Excellent Delivery Project Manager, 2015
- Excellent Team Lead for SAP/FA, 2014
- Best Emerging Leader, 2011
- Excellent Plan Control Manager, 2010

## SELECTED PUBLICATIONS

Author and co-author of over **55** peer-reviewed journal articles and **18** conference proceedings published in reputed international journals and conferences.

- **Mumtaz, F.\***, et al. “Distributed Sapphire Fiber Bragg Grating-Based Thermal Profiling of Submerged Entry Nozzles.” *IEEE Trans. Instrumentation & Measurement*, 2025.
- Wang, X., Liu, N., Huang, Z., Yang, J., Chen, G., Li, B., Xie, T., Overa, S., Brozena, A., Li, T., **Mumtaz, F.**, Zhang, B., Lin, Y., Li, M., Mei, B., Li, S., Huang, J., Huang, J., Jiao, F., Gong, C., Wang, G., Chi, M., Takeuchi, I., & Ju, Y. (2025). Ultrahigh-temperature, atmospheric-pressure electrified vapor deposition for nanomaterials synthesis. *Nature Synthesis*, (Accepted).
- Yang, J., Dong, Q., Zhang, C., Zhang, W., **Mumtaz, F.**, et al., & Nascimento, C. A. (2025). Selective electrified polyethylene upcycling by pore-modulated pyrolysis. *Nature Chemical Engineering*, **2**(7), 424–435, 2025.
- Hungund, A.P., Zhang, B., **Mumtaz, F.**, et al. “Pendant  $\mu$ -Droplet Evaporation Fabricates Fiber-Optic MOF Gas Sensor.” *ACS Sensors*, 2025 (Accepted).
- **Mumtaz, F.\***, B. Zhang, K. Dey, J. D. Smith, R. J. O’Malley, J. Huang, “Discrimination of Temperature and Strain by Characterizing Two Femtosecond Laser-Written Coincident Sapphire Fiber Bragg Gratings for Harsh Environment Applications,” *IEEE Trans. Instrum. Meas.*, vol. 1, 2025.
- O. C. Inalegwu, R. K. Saha, Y. R. Mekala, **Mumtaz, F.\***, et al., “Advancing Temperature Monitoring of the Bottom Anode in Direct Current Electric Arc Furnace Operations with Distributed Optical Fiber Sensors,” *IEEE Trans. Instrum. Meas.*, 2025.
- **Mumtaz, F.\***, Zhang, B., et al. “Discrimination of Temperature and Strain by Two Femtosecond Laser-Written Coincident Sapphire Fiber Bragg Gratings.” *IEEE Trans. Instrumentation and Measurement*, 2024.
- **Mumtaz, F.\***, Zhang, B., et al. “Miniature Fabry-Perot Interferometer Based on Metal-Organic Framework for Benzene Detection.” *ACS Applied Materials & Interfaces*, 2024.
- **Mumtaz, F.\***, Tekle, H., Zhang, B., et al. “Highly Cascaded First-order Sapphire Optical Fiber Bragg Gratings Fabricated by Femtosecond Laser.” *Optics Letters*, 2023.
- **Mumtaz, F.\***, Zhang, B., O’Malley, R., and Huang, J. “Large-Scale Cascading of FBG Array in Highly Multimode Coreless Fiber.” *Optics Express*, 2023.
- Y. Wang, Y. Dai, **Mumtaz, F.**, K. Luo “Advanced Quartz Wafer Processing via Stealth Dicing by Laser Filamentation,” *Optics & Laser Tech.*, 171, 110474, 2024.
- Y. Wang, **Mumtaz, F.**, Y. Dai “Micromachining of  $\text{SiO}_2$  Single-Crystal Wafers Using Femtosecond Lasers,” *J. Laser Applications*, 35(2), 2023.
- Y. Wang, Y. Wang, Y. Dai, **Mumtaz, F.** “Nitrogen Jet-Assisted Femtosecond Laser Processing of Quartz Chips,” *Opt. Mater. Express*, 13(2), 348–356, 2024.
- **Mumtaz, F.\***, “Detection of critical cancer cells in human organs using dual demodulation photonic crystal fiber: numerical study,” *Results Opt.*, vol. 12, 100493, 2023.
- **Mumtaz, F.\***, M. Roman, B. Zhang, L. G. Abbas, Y. Dai, M. A. Ashraf, M. A. Fiaz, et al., “MXene ( $\text{Ti}_3\text{C}_2\text{Tx}$ ) coated highly-sensitive D-shaped photonic crystal fiber based SPR-biosensor,” *Photonics Nanostruct.-Fundam. Appl.*, vol. 52, 101090, 2022.
- **Mumtaz, F.\***, Y. Dai, M. A. Ashraf, “Inter-cross de-modulated refractive index and temperature sensor by an etched multi-core fiber of a MZI structure,” *J. Lightwave Technol.*, vol. 38, no. 24, pp. 6948-6953, 2020.
- Full list: [Google Scholar](#)

## PATENTS

- Hungund, A.P., O'Malley, R., Mumtaz, F., et al. "Integrated System for Rapid Fabrication, Calibration, and Testing of Optical Fiber MOF Sensors." U.S. Provisional Patent Application.
- Huang, J., Mumtaz, F., O'Malley, R. "Multi-order Line-by-Line and Point-by-Point Sapphire Optical Fiber Bragg Gratings Using Femtosecond Laser." U.S. Provisional Patent Application.

## INVITED PRESENTATIONS & SEMINARS

- SPIE Proceedings: Optical Waveguide and Laser Sensors III, 2024 (Invited)
- Maryville University – Fiber Optic Sensors and Applications, 2023 (Invited)
- IEEE, Optical Communications and Networks, Huangshan, China, 2019 (Invited)

## PROFESSIONAL MEMBERSHIPS & SERVICE

- IEEE Senior Member
- Member: Optical Society of America (OSA), SPIE, AISTech
- Guest Editor:
  - MDPI Coatings
  - MDPI Materials
- Reviewer for IEEE Photonics, Optics Letters, Optics Express, Optics Materials Express, Measurement, IEEE Sensors Journal, IEEE Transactions on Instrumentation and Measurement, Springer Nature, Applied Physics B, MDPI Applied Sciences, MDPI Axioms, MDPI Energies, MDPI Mathematics, Optical Fiber Technology, MDPI Photonics, MDPI Sensors, MDPI Electronics, International Journal of Optics (Wiley), Journal of Sensors (Wiley), Springer Nature and others.

## RESEARCH FUNDING SUPPORT

- U.S. Air Force 3D Printed Investment Casting Shell Project
- U.S. Department of Energy, Office of Energy Efficiency and Renewable Energy (DE-EE0009119, DE-EE0009392)
- U.S. Army Research Laboratory (W911NF-21-2-0280)
- MATERIALS TECHNOLOGY INSTITUTE, INC, USA "Fiber Optic Temperature Monitoring Sensors for CPI and Refining Processes" (Award No: 0081251)
- National Science Foundation of China (51975442, 61475121)
- Major Technique Innovation Program of Hubei Province (2018AAA016)
- National Key Research and Development Program of China (2017YFB0405501)

## STUDENT MENTORSHIP

### PhD Students:

- Ogbole C. Inalegwu  
(EE, Missouri S&T) – Graduated
- Anand K. Nambisan  
(EE, Missouri S&T) – Graduated
- Nahideh S. Salehifar  
(EE, Missouri S&T) – Graduated
- Homayoon S. Dinani  
(EE, Missouri S&T) – In-progress
- Ruimin Jie  
(EE, Missouri S&T) – In-progress
- Robert Abbott  
(CE, Missouri S&T) – In-progress
- Yeshwanth R. Mekala

(MSE, Missouri S&T) – In-progress

- Mobashir Ahmed  
(MSE, Missouri S&T) – In-progress
- Hanok Tekle  
(MSE, Missouri S&T) – In-progress
- Rony K. Saha  
(EE, Missouri S&T) – In-progress

### Master Students:

- Rony K. Saha  
(EE, Missouri S&T) – Graduated
- Abhishek P. Hungund  
(EE, Missouri S&T) – Graduated
- Abdul Muqet

- (EE, Quaid-i-Azam Univ.) – Graduated
- Ghulam Yaseen
- (EE, Quaid-i-Azam Univ.) – Graduated

**Undergrad Students:**

- Michael Davis  
(EE, Missouri S&T) – In-progress

## PROFESSIONAL TRAININGS

- BOTDR & BOTDA, ZOOPTCS, Canada, 2022
- Glass Process GPX-3400, ThorLabs, USA, 2023
- COMSOL Multiphysics, Wuhan University of Technology, 2019
- Project Management, PMI, Islamabad, 2017
- Multiple Technical and Quality Trainings, Huawei Pakistan (2010–2014)

## TECHNICAL SKILLS

- Data analysis, Machine learning, Artificial intelligence
- Scientific Software and Instrumentation
- Microsoft Office and Project Management Tools
- Scanning Electron Microscopy (SEM) Imaging and Analysis
- Femtosecond Laser Micromachining (Line, Point, Volume)
- Optical Signal Path & Grating Design
- Waveguide Writing on Sapphire, Silica, SiO<sub>2</sub>, Salt-Based Wafers
- Bio-compatible Sensor Fabrication (Electrochemical, Biodegradable)
- Multimode Interference Suppression, Mode Scramblers
- Photonic Crystal Fiber Simulation (Linear/Nonlinear)
- Wafer-Level Optical Testing (Keysight, DAQ Systems)
- Distributed Sensing – Strain/Temperature (Microwave Photonics)
- Structural Health (OZ-Optics BOTDA & R/ LUNA ODiSI OFDR)
- Optical Interconnects, Signal Integrity Optimization
- CAD/Simulation: RSoft Beam Prop, COMSOL, SolidWorks, AutoCAD, Excel, MATLAB
- Dispersion Management in Optical Signal Path Design
- Microwave photonic, Vector analyzers, power meters
- Raman spectroscopy for material characterizations
- Glass processing for tapering and ball lens fabrication (GPX3400, Thorlabs)

## TELECOM INDUSTRY EXPERIENCE SUMMARY

Over nine years at Huawei Technologies (2007-15), I led large-scale telecom infrastructure projects with a strong focus on embedded systems, hardware deployment, and high-speed communication technologies. My work spanned wireless and optical network systems, real-time embedded hardware integration, and system-level reliability — all highly relevant to modern computer engineering challenges in high-performance, AI-enabled, and resilient architectures.

- **Embedded and Communication Systems Integration**  
Managed the end-to-end deployment of CDMA, LTE, GPON, DSLAM, and DWDM systems across nationwide networks. Led technical teams in integrating baseband units, high-speed optical transceivers, and power control systems into operational infrastructure. Addressed signal integrity, data throughput, and system uptime under real-world constraints.
- **High-Reliability Infrastructure and Thermal Systems**  
Directed engineering rollouts involving power-optimized telecom systems, including fast-charging battery modules (FCB/ACB) to ensure thermal resilience and low-latency recovery during power failures. These efforts reflect core challenges in energy-aware computing hardware and thermally constrained embedded platforms.
- **System Validation and Hardware Acceptance**  
Headed final acceptance testing (FAC) for over 40 projects across CDMA, GPON, DWDM, and core

switching domains. Performed large-scale validation of network elements, data planes, and power interfaces—developing system-level diagnostics and performance baselines essential for reliable hardware design.

- **Technical Leadership in Embedded Infrastructure and Scalable Systems**

Led architecture planning and performance benchmarking of large-scale communication systems with embedded control, real-time monitoring, and firmware-level optimization. Oversaw the integration of terminal products such as IPTV units, CPEs, and WDM amplifiers into high-throughput network environments. While AI frameworks were not yet prevalent, the systems-level design principles—including distributed processing, hardware-software co-optimization, and resource-efficient data handling—form the foundation of today’s AI edge computing and smart infrastructure.

- **Digital Systems Planning and Deployment Automation**

Led digital plan-control operations using SAP and custom scheduling tools to track project dependencies, hardware provisioning, and system milestones. Developed automated reporting dashboards for pre-deployment hardware verification, failure analysis, and embedded diagnostics tracking.

These technical experiences provide a strong foundation for developing and teaching next-generation computing systems that bridge photonic integration, embedded AI accelerators, and thermal-aware architecture design—fully aligned with institutional strategic priorities in Industrial Engineering.

## TEACHING EXPERIENCE

### Undergraduate Courses Taught (2016–2021)

- **Photonics and Waveguide**

Principles of light propagation in dielectric media, guided-wave optics, waveguide structures, mode analysis, dispersion, and photonic devices.

- **COMSOL Multiphysics for Optical Simulations**

Simulation of photonic and optical systems using COMSOL Multiphysics, including wave propagation, resonator design, coupling analysis, and material interaction modeling.

- **Digital Logic Design**

Fundamentals of logic gates, Boolean algebra, combinational and sequential circuits, and FPGA-based implementations.

- **Digital Communication**

Baseband and passband transmission, modulation schemes, error detection and correction, and signal-to-noise optimization.

- **Digital Signal Processing**

Discrete-time systems, Z-transforms, FFT algorithms, FIR/IIR filter design, and signal reconstruction.

- **Information Theory**

Entropy, mutual information, channel capacity, coding theorems, and applications in data compression and communication.

- **Electromagnetics and Microwave Engineering**

Maxwell’s equations, waveguides, transmission lines, S-parameters, and microwave circuit design.

- **Electromagnetic Scattering (EMT)**

Analysis of wave scattering, boundary conditions, material interactions, and radar cross-section.

- **Wireless Communications**

Cellular systems, propagation models, channel fading, OFDM, and multi-antenna (MIMO) systems.

- **Microprocessor Technology**

Architecture and interfacing of microprocessors/microcontrollers, including assembly, programming and peripheral control.

## REFERENCES

Available upon request.

## List of Publications

### Journal Papers (2025)

1. Farhan Mumtaz\*, et al., “Waveguide-assisted single-mode fiber Bragg gratings in a highly multimode coreless fiber via femtosecond laser inscription for extreme temperature quasi distributed thermal sensing,” *Journal of Lightwave Technology*, (Under review – 2025).
2. X. Wang, N. Liu, Z. Huang, J. Yang, G. Chen, B. Li, T. Xie, S. Overa, A. Brozena, T. Li, F. Mumtaz, B. Zhang, Y. Lin, M. Li, B. Mei, S. Li, J. Huang, J. Huang, F. Jiao, C. Gong, G. Wang, M. Chi, I. Takeuchi, Y. Ju, “Ultrahigh-Temperature, Atmospheric-Pressure Electrified Vapor Deposition for Nanomaterials Synthesis,” *Nature Synthesis*, 2025. (Accepted).
3. Ruimin Jie, Robert Abbott, Ogbole Inalegwu, Farhan Mumtaz, et al., “A micro-structured optical fiber negative hydraulic pressure sensor,” *Journal of Lightwave Technology*, (Under review – 2025).
4. Bohong Zhang, Hanok Tekle, Ronald J. O’Malley, Jeffrey D. Smith, Farhan Mumtaz\*, and Jie Huang, “In situ high-temperature Raman spectroscopy for online EAF slag analysis,” *Journal of Materials Research and Technology*, Available online: Aug. 19, 2025. [Online]. Available: <https://doi.org/10.1016/j.jmrt.2025.08.132>
5. Abhishek Prakash Hungund, Bohong Zhang, Narasimman Subramaniam, Thomas Spudich, Ryan O’Malley, Farhan Mumtaz, et al., “Pendant  $\mu$ -Droplet Evaporation Fabricates Fiber-Optic MOF Gas Sensor in Seconds,” *ACS Sensors*, (Accepted – 2025).
6. F. Mumtaz\*, H. Tekle, B. Zhang, X. Li, S. Abraham, B. Mathis, J. D. Smith, *et al.*, “Distributed Sapphire Fiber Bragg Gratings-Based Thermal Profiling of Submerged Entry Nozzles,” *IEEE Trans. Instrum. Meas.*, 2025.
7. I. Sario, G. A. Lashari, A. A. Memon, F. Mumtaz\*, “Design and Numerical Investigation of Surface Plasmon Resonance-Based Refractive Index Sensor,” *Plasmonics*, pp. 1-16, 2025.
8. J. Yang, Q. Dong, C. Zhang, W. Zhang, J. Miscall, A. H. Brozena, J. Chen, N. Liu, *et al.*, “Selective Electrified Polyethylene Upcycling by Pore-Modulated Pyrolysis,” *Nature Chemical Eng.*, vol. 2, no. 7, pp. 424-435, 2025.
9. O. C. Inalegwu, R. K. Saha, Y. R. Mekala, F. Mumtaz, *et al.*, “Advancing Temperature Monitoring of the Bottom Anode in Direct Current Electric Arc Furnace Operations with Distributed Optical Fiber Sensors,” *IEEE Trans. Instrum. Meas.*, 2025.
10. O. C. Inalegwu, M. Roman, F. Mumtaz, B. Zhang, A. Nambisan, J. Huang, “Machine Learning-Assisted Optical Fiber Specklegram Sensor for Early and Spatially Distributed Water Leak Detection and Localization,” *Opt. Eng.*, vol. 64, no. 5, 056103, 2025.
11. G. A. Lashari, F. Mumtaz\*, A. Aziz, M. Ali, “Temperature Measurement with Compact Fabry-Perot Interferometer Employing Polymer-Filled Hollow Core Fiber,” *Optik*, vol. 327, 172277, 2025.
12. F. Mumtaz\*, B. Zhang, K. Dey, J. D. Smith, R. J. O’Malley, J. Huang, “Discrimination of Temperature and Strain by Characterizing Two Femtosecond Laser-Written Coincident Sapphire Fiber Bragg Gratings for Harsh Environment Applications,” *IEEE Trans. Instrum. Meas.*, vol. 1, 2025.

### Journal Papers (2024)

13. Y. Wang, Y. Dai, F. Mumtaz, K. Luo, “Advanced techniques in quartz wafer precision processing: Stealth dicing based on filament-induced laser machining,” *Optics Laser Technology*, vol. 171, 110474, 2024.
14. A. Muqet, M. A. Ashraf, F. Mumtaz\*, “Spatially tuned photonic crystal fiber sensor mimics visible and near-infrared regimes for wide-range multi-analyte detection,” *Measurement*, vol. 227, 114272, 2024.
15. F. Mumtaz\*, B. Zhang, N. Subramaniam, M. Roman, P. Holtmann, et al., “Miniature optical fiber Fabry–Perot interferometer based on a Single-Crystal Metal–Organic framework for the detection and quantification of benzene and ethanol at low concentrations,” *ACS Appl. Mater. Interfaces*, vol. 16, no. 10, pp. 13071-13081, 2024.
16. F. Mumtaz\*, B. Zhang, J. D. Smith, R. J. O’Malley, R. E. Gerald, J. Huang, “Ultrafast annealing improves SNR and long-term stability of a highly multiplexed line-by-line FBG array inscribed by femtosecond laser in a coreless fiber for extreme applications,” *IEEE Trans. Instrum. Meas.*, vol. 73, pp. 1-10, 2024.
17. B. Zhang, F. Mumtaz, M. Roman, D. R. Alla, R. E. Gerald II, J. Huang, “Miniaturized fluorescence pH sensor with assembly free ball lens on a tapered multimode optical fiber,” *Opt. Express*, vol. 32, no. 3, pp. 4228-4241, 2024.

### Journal Papers (2023)

18. D. R. Alla, D. P. Neelakandan, F. Mumtaz, R. E. Gerald, L. Bartlett, R. J. O’Malley, et al., “Cascaded sapphire fiber Bragg gratings inscribed by femtosecond laser for molten steel studies,” *IEEE Trans. Instrum. Meas.*, vol. 73, pp. 1-8, 2023.
19. F. Mumtaz\*, H. Tekle, B. Zhang, J. D. Smith, R. J. O’Malley, R. E. Gerald, J. Huang, “Boosting SNR of cascaded FBGs in a sapphire fiber through a rapid heat treatment,” *Opt. Lett.*, vol. 48, no. 21, pp. 5703-5706, 2023.
20. Y. Wang, Y. Dai, F. Mumtaz, Y. Yang, K. Luo, “A combined tri-dimensional fiber Bragg grating accelerometer for multi-directional measurements,” *Opt. Fiber Technol.*, vol. 79, 103360, 2023.
21. F. Mumtaz\*, B. Zhang, R. J. O’Malley, J. Huang, “Large-scale cascading of first-order FBG array in a highly multimode coreless fiber using femtosecond laser for distributed thermal sensing,” *Opt. Express*, vol. 31, no. 18, pp. 29639-29653, 2023.
22. F. Mumtaz\*, H. Tekle, B. Zhang, J. D. Smith, R. J. O’Malley, J. Huang, “Highly cascaded first-order sapphire optical fiber Bragg gratings fabricated by a femtosecond laser,” *Opt. Lett.*, vol. 48, no. 16, pp. 4380-4383, 2023.
23. F. Mumtaz\*, “Detection of critical cancer cells in human organs using dual demodulation photonic crystal fiber: numerical study,” *Results Opt.*, vol. 12, 100493, 2023.
24. G. A. Lashari, F. Mumtaz\*, Z. Ai, Y. Dai, “Recent advancements and future challenges in hybrid optical fiber interferometers,” *Optik*, vol. 282, 170860, 2023.

25. Y. Wang, F. Mumtaz\*, Y. Dai\*, “Hydrogen gas sensor based on seven-core fiber interference and Pt-WO<sub>3</sub> film,” *Mater. Lett.*, vol. 341, 134245, 2023.
26. Y. Wang, F. Mumtaz, Y. Dai, “Micromachining of SiO<sub>2</sub> single crystal wafer using femtosecond laser,” *J. Laser Appl.*, vol. 35, no. 2, 2023.
27. N. M. Anjum, F. Mumtaz\*, M. A. Ashraf, “Design and analysis of gold-nanowires based multi-channel SPR sensor,” *Results Opt.*, vol. 11, 100397, 2023.
28. F. Mumtaz\*, M. Roman, B. Zhang, J. Huang, “Assembly-free ultra-sensitive miniaturized strain sensor based on an asymmetric optical fiber taper,” *Measurement*, vol. 211, 112655, 2023.
29. F. Mumtaz\*, B. Zhang, M. Roman, L. G. Abbas, M. A. Ashraf, Y. Dai, “Computational study: Windmill-shaped multi-channel SPR sensor for simultaneous detection of multi-analyte,” *Measurement*, vol. 207, 112386, 2023.
30. F. Mumtaz\*, D. R. Alla, M. Roman, B. Zhang, J. D. Smith, R. E. Gerald, et al., “Thermally robust and highly stable method for splicing silica glass fiber to crystalline sapphire fiber,” *Appl. Opt.*, vol. 62, no. 5, pp. 1392-1398, 2023.
31. Y. Wang, Y. Wang, Y. Dai, F. Mumtaz, “Ultrasonic nitrogen jet-assisted femtosecond laser processing of quartz chips,” *Opt. Mater. Express*, vol. 13, no. 2, pp. 348-356, 2023.

### **Journal Papers (2022)**

32. F. Mumtaz\*, G. Yaseen, M. Roman, L. G. Abbas, M. A. Ashraf, M. A. Fiaz, Y. Dai, “Numerical analysis of the highly non-linear and ultra-sensitive modified core of a photonic crystal fiber sensor for detection of liquid analytes,” *J. Opt. Soc. Am. B*, vol. 40, no. 1, pp. 142-150, 2022.
33. F. Mumtaz\*, M. Roman, B. Zhang, L. G. Abbas, Y. Dai, M. A. Ashraf, M. A. Fiaz, et al., “MXene (Ti<sub>3</sub>C<sub>2</sub>Tx) coated highly-sensitive D-shaped photonic crystal fiber based SPR-biosensor,” *Photonics Nanostruct.-Fundam. Appl.*, vol. 52, 101090, 2022.
34. G. A. Lashari, F. Mumtaz\*, S. Ahmed, “Strain sensing with parallel air-cavity Fabry-Perot interferometers based on Vernier Effect,” *Opt. Fiber Technol.*, vol. 74, 103117, 2022.
35. M. Roman, H. Tekle, D. R. Alla, F. Mumtaz, J. D. Smith, L. Bartlett, R. J. O'Malley, et al., “Temperature monitoring in the refractory lining of a continuous casting tundish using distributed optical fiber sensors,” *IEEE Trans. Instrum. Meas.*, vol. 72, pp. 1-11, 2022.
36. F. Mumtaz\*, M. Roman, B. Zhang, L. G. Abbas, M. A. Ashraf, Y. Dai, J. Huang, “Highly sensitive strain sensor by utilizing a tunable air reflector and the Vernier effect,” *Sensors*, vol. 22, no. 19, 7557, 2022.
37. F. Mumtaz\*, M. Roman, B. Zhang, L. G. Abbas, M. A. Ashraf, M. A. Fiaz, Y. Dai, et al., “A simple optical fiber SPR sensor with ultra-high sensitivity for dual-parameter measurement,” *IEEE Photonics J.*, vol. 14, no. 5, pp. 1-7, 2022.

38. L. G. Abbas, F. Mumtaz\*, R. Parveen, Y. Dai, M. A. Ashraf, "An efficacious hybrid interferometer based on a Vernier-like effect for dual parameter sensing," *Optik*, vol. 264, 169422, 2022.
39. L. G. Abbas, F. Mumtaz, Y. Dai, R. Parveen, M. A. Ashraf, "Vernier effect based temperature sensor revealed ultra-sensitivity with high-detection resolution," *Prog. Electromagn. Res. C*, vol. 118, 2022.

### Journal Papers (2021)

40. L. G. Abbas, Z. Ai, F. Mumtaz, A. Muhammad, Y. Dai, R. Parveen, "Temperature and strain sensing with hybrid interferometer," *IEEE Sensors J.*, vol. 21, no. 23, pp. 26785-26792, 2021.
41. F. Mumtaz\*, H. Lin, Y. Dai, W. Hu, M. A. Ashraf, L. Ghulam Abbas, S. Cheng, et al., "Simultaneous measurement of temperature and strain using multi-core fiber within-line cascaded symmetrical ellipsoidal fiber balls-based Mach-Zehnder interferometer structure," *Prog. Electromagn. Res. C*, vol. 112, pp. 21-34, 2021.
42. Y. Jie, L. A. Leonidas, F. Mumtaz, M. Ali, "Ship detection and tracking in inland waterways using improved YOLOv3 and Deep SORT," *Symmetry*, vol. 13, no. 2, p. 308, 2021.
43. F. Mumtaz\*, Y. Dai, H. Wenbin, L. G. Abbas, R. Parveen, M. A. Ashraf, "A weakly coupled multi-core fibre-based Michelson interferometer composed of an in-fibre coupler," *Opto-Electron. Rev.*, pp. 117-125, 2021.
44. L. G. Abbas, F. Mumtaz, Y. Dai, A. Zhou, W. Hu, M. A. Ashraf, "Highly sensitive polymer based Fabry-Perot interferometer for temperature sensing," *Prog. Electromagn. Res. Lett.*, vol. 97, pp. 87-94, 2021.
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### **Paper (2020)**

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### **Paper (2019)**

20. H. Lin, Y. Xu, F. Mumtaz\*, Y. Dai\*, A. Zhou, “Cascaded Fabry–Pérot interferometers with Vernier effect for gas pressure measurement,” in *Proc. 2019 18th Int. Conf. Optical Commun. Networks*, pp. 1-4, 2019.

## **Patents**

- Abhishek Prakash Hungund, Ryan O’Malley, Farhan Mumtaz et al., “Integrated System for Rapid Fabrication, Calibration, and Testing of Optical Fiber Metal-Organic Framework Sensors in a Controlled Gas Microenvironment,” U.S. Provisional Patent Application.
- Jie Huang, Farhan Mumtaz\*, and Ronald O’Malley, “Multi-order Line-by-Line and Point-by-Point Sapphire Optical Fiber Bragg Gratings Using Femtosecond Laser Techniques,” U.S. Provisional Patent Application.

## **Invited Presentations & Seminars**

- SPIE Proceedings: Optical Waveguide and Laser Sensors III, 2024 (Invited)
- Maryville University – Fiber Optic Sensors and Applications, 2023 (Invited)
- IEEE, Optical Communications and Networks, Huangshan, China, 2019 (Invited)

## References

- **Dr. Jie Huang**  
Roy A. Wilkens Endowed Professor  
Dept. of Electrical and Computer Engineering,  
Missouri S&T Rolla, MO, USA  
Email: [jieh@mst.edu](mailto:jieh@mst.edu)  
Phone: +1 (573) 341-4836
- **Dr. Ronald J. O'Malley**  
F. Kenneth Iverson Chair Professor  
Dept. of Metallurgical Engineering,  
Missouri S&T Rolla, MO, USA  
Email: [omalleyr@mst.edu](mailto:omalleyr@mst.edu)  
Phone: +1 (573) 341-7683
- **Dr. Liangbing (Bing) Hu**  
Director, Center for Materials Innovation  
Carol and Douglas Melamed Professor  
Departments of Electrical and Computer Engineering & Materials Science  
Yale University  
Central Campus: 15 Prospect St., Becton 513, New Haven, CT 06511  
Phone: (203) 436-3543  
West Campus: 520 West Campus Dr., ESC I – 133, West Haven, CT 06516  
Phone: (203) 737-4996  
Email: [liangbing.hu@yale.edu](mailto:liangbing.hu@yale.edu)
- **Dr. Rex Gerald II**  
Lead Research Consultant/ Professor  
Department of Electrical and Computer Engineering  
Missouri University of Science and Technology – Rolla  
Phone: (573) 341-4836  
Email: [geraldr@mst.edu](mailto:geraldr@mst.edu),
- **Dr. Jeffrey D. Smith**  
Professor in Ceramic Engineering  
Assistant Center Director, PSMRC  
Department of Materials Science and Engineering  
Missouri University of Science and Technology – Rolla  
Phone: (573) 341-4447  
Email: [jsmith@mst.edu](mailto:jsmith@mst.edu),