Nadir Ali

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Summary of Qualifications

Ph.D. in Physics with a solid background in photonics device design and EM modelling
Designed and modeled optical interconnects for silicon photonic platform
High expertise in commercial software like CST and COMSOL
Collaborated with faculties and researchers with effective teamwork skills
Data Analysis, Research Analysis, Project Management
Problem solver, quick learner, self-motivated

Education

Indian Institute of Technology Roorkee, India, Ph.D. Physics, *Photonics* 2021

Jamia Millia Islamia University, India M. Sc. Physics, *Laser and Spectroscopy* 2015

Jamia Millia Islamia University, India B. Sc. (H) Physics 2013

Teaching/ Supervising Experience

Teaching Assistant, Indian Institute of Technology Roorkee 2016-2021

Mentoring undergraduate and postgradguate students.
Assisting with program development and student assessment
Delivering teaching tutorials on B Tech Electromagnetic Theory, Optics, and Matlab.
Demonstrating B Tech Physics and M. Tech Photonics experiments.
Student assessment.

Research Experiences

Nonvolatile Silicon Photonic Switches Enabled by Embedded Phase Change Material:

Ph.D. Advisor: Prof. Rajesh Kumar

Department of Physics, Indian Institute of Technology Roorkee, Roorkee. 2016-2021

Worked on theory, design and modeling of hybrid silicon photonic devices; exploited the high refractive contrast and self-holding bi-stable phase change materials to realize optical signal processing functionalities such as coupling, phase matching, modulation, and filtering.

Designed and modeled photonic switch using GST and silicon waveguides.
Designed and modeled 1×1 and 1×2 switches using GST-Si directional couplers.
Modeled and analyzed electrically tunable wavelength filter using hybrid Si microring.
Developed a multi-physics model in CST to study electrical, optical, and thermal behavior.
Photonic device measurement using the visible camera chip measurement set-up.

Semiconductor Lasers: Thesis Advisor: Prof. Dr. A. K. Hafiz

Physics Department, Jamia Millia Islamia University, New Delhi 2013–2015

Theoretical study of optical feedback in coupled semiconductor lasers and analysis of performance characteristics.

Research Interests

Optical interconnects, Photonic switches, Electromagnetic modelling techniques, Photonics Integrated Circuits, Silicon Photonics, Electro/Thermo-optic materials, Fiber-Optics, Phase Change Materials, Semiconductor Photonics, Non-volatile Switches, Neuromorphic Photonics, AI Hardware, Transparent Conductive Oxides etc.

SKILLS & TRAINING

Design & Simulation

CST Microwave Studio (FIT, FEM) · COMSOL Multiphysics (FDTD, FEM) · Python · Matlab · KLayout · PDK · Origin · Adobe Illustrator

Integrated Photonics

Waveguides · Directional couplers · Microring resonators · Mach-Zehnder interferometers · Electro-Optic and Thermo-Optic Switches · Tunable Wavelength Filters

Measurement & Testing

Electrical/Optical Probing · Optical Alignment · Visible Camera Measurement · Free-space Measurement · Fiber Optic cable measurement · Tunable Laser · Optical Spectrum Analyzer · BERT · VNA · Statistical Data Analysis

Workshops & Courses

High Speed Optical Transmitters for Optical Interconnects, IIT Roorkee 2018

Workshop on "Nanofabrication Technologies" at IIT Roorkee 2017

Publications

Book Chapter

N. Ali, F Abdullah, and R. Kumar, *"Silicon Photonic Switches,"* in Optical Switching: Device Technology and Applications in Networks, Wiley Publishing Inc. (2022).

Journal Articles

F. Abdullah, **N. Ali**, and R. Kumar, *"Active volume optimization and opto-thermal analysis approach for design of phase change photonic memory cells."* (Submitted JOSA B).

N. Ali, R. Panepucci, Y. Xie, D. Dai, and R. Kumar, *"Electrically controlled 1 × 2 tunable switch using phase change material embedded silicon microring,"* Applied Optics, vol. 61 (12), 3559-68 (2021).

N. Ali and R. Kumar, *"Mid-infrared non-volatile silicon photonic switches using nanoscale Ge2Sb2Te5 embedded in silicon-on-insulator waveguides,"* Nanotechnology, 31(11), 115207 (2020).

N. Ali and R. Kumar, *"Design of a novel nanoscale high-performance phase-change silicon photonic switch,"* Photonics Nanostructures - Fundamentals and Applications, 32, 81–85 (2018).

Selected Conference Publications

J. Ahuja, S. Singh, **N. Ali**, and R. Kumar, *"Sub-nanojoule electro-optic switching using Ge2Sb2Te5 integrated on silicon waveguide,"* in International Photonics and Opto Electronics Meeting 2019, p. JW4A.76 (2019).

R. Kumar, **N. Ali**, and S. Singh, *"High performance and CMOS compatible photonic switches based on phase change materials,"* in Optoelectronic Devices and Integration VIII, 11184, 111840C (2019).

N. Ali and R. Kumar, *"Tunable optical filter enabled by phase change material embedded in SOI microring resonator,"* in JSAP-OSA Joint Symposia 2019, p. 20a_E215_4 (2019).

N. Ali and R. Kumar, *"Design and simulations of photonic switch using hybrid -silicon waveguides in Mid-IR region,"* in 17th International Conference on Optical Communications and Networks (ICOCN-2018), 11048, 36–37 (2019).

N. Ali and R. Kumar, *"Chip-scale mid infra-red photonic switch based on Ge2Sb2Te5 incorporated in SOI waveguide,"* in Proceedings of the Photonics-2018, SB1-C1 (2018).

N. Ali and R. Kumar, *"Mid Infra-red directional coupler optical switch based on phase change material embedded in partially etched SOI waveguide,"* in Frontiers in Optics-2018, p. JTu2A.102 (2018).

Academic Honors

Travel Grant for JSAP-OSA-2019, Japan, by DOSW, IIT Roorkee	2019
Best Paper Award, ICOCN Conference, Zhuhai, China	2018
SRF, MHRD Fellowship Award	2018-21
JRF, MHRD Fellowship Award	2016-18

Professional Affiliations

OSA Student Chapter

Journal Review

IOP Nanotechnology

References

Available upon request.