

Md Mottaleb Hossain

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CITIZENSHIP STATUS

United States Citizen and New Mexico Resident (ability to obtain security clearance if required)

EDUCATION

- Ph.D.**, May 2019, Optical Science & Engineering (Photonics track); **GPA:** 3.82
Department of Electrical & Computer Engineering, University of New Mexico, USA
Dissertation title: *Algorithmic multi-color CMOS avalanche photodiodes for smart-lighting applications*
- M.S.**, July 2015, Optical Science & Engineering (Photonics track), University of New Mexico, USA
Thesis title: *Linear mode CMOS compatible p-n junction avalanche photodiode for smart-lighting applications*
- B.S.**, Mar. 2009, Electrical & Electronic Engineering; **GPA:** 3.59
Khulna University of Engineering & Technology (KUET), Khulna-9203, Bangladesh

EMPLOYER/QUALIFICATIONS/EXPERIENCE

- University of New Mexico, Department of Electrical & Computer Engineering, Albuquerque, NM
Graduate Assistant: Aug. 2018 – Dec. 2018
Accomplishments:
 - Taught 24 students in the *microelectronics processing lab* course (ECE 574L), as a lab instructor, to fabricate N-MOS transistors successfully at the cleanroom located at the UNMs Center for High Tech Materials (CHTM).
- University of New Mexico, Center for High Technology Materials, Albuquerque, NM
Graduate Research Assistant: Aug. 2012 – Aug. 2018
Accomplishments:
 - Development of process to fabricate low-voltage (below 9 V) CMOS avalanche photodiodes (APDs) for smart-lighting applications.
 - Trained to operate device fabrication tools including mask aligner (Karl Suss MJB3), diffusion/oxidation furnaces (Lindbergh), ellipsometer (J.A. Woollam M2000), profilometer (Dektak 6M), and e-beam metal evaporator (Aircro-Temesca).
 - Demonstration of extremely low-noise for the speed-optimized large-area CMOS APDs for visible light communication (VLC).
 - Development of mixed-injection exact analytical formula as well as exact numerical method for excess noise factor for APDs.
 - Development of low-cost algorithmic spectral sensor for adaptive lighting system.Funding Agency: National Science Foundation (NSF) Engineering Research Center (ERC) under the Lighting Enabled Systems & Applications (LESA).
- Sandia National Laboratories (SNL), Center for Integrated Nanotechnologies (CINT), Albuquerque, NM
Graduate Student Researcher: Jan. 2016 – Sept. 2016
Accomplishments:
 - Development of automation and measurement systems for continuous-variable quantum key distribution (CV-QKD) using LabVIEW software tools for the Sandia enabled communications and authentication network using QKD.
 - Multiple I-V measurements (DC) on Gen-1 Bob chips to check repeatability as well as calculations of extinction ratios from experiments.Funding Agency: U.S. Department of Energy (U.S.-DOE)

RESEARCH INTERESTS

Semiconductor processing, Silicon photonics, CMOS Avalanche photodiodes, Spectral sensors, Spectral sensing algorithm, and Visible-light communication.

TECHNICAL SKILLS

- Semiconductor process development: Thin films, Oxidation, Diffusion, Lithography, Wet etch, Electron beam physical vapor deposition (EBPVD), Profilometry, and Ellipsometry.
- Modeling (numerical/analytical) and characterization of APD devices.
- Design of experiments and semiconductor physics.
- Programming/data retrieval.

SOFTWARE SKILLS

Sentaurus TCAD device simulator, LabVIEW, MATLAB, and Microsoft Office.

INTERPERSONAL SKILLS

- Ability to work independently as well as in cross-group and cross-culture environment.
- Ability to present data in a clear, concise way.
- Collaborative work ethic with detail oriented personality.

SELECTED PUBLICATIONS**JOURNALS**

1. **M. M. Hossain** and M. M. Hayat, "Visible spectral-detection of a high-responsivity CMOS compatible dual avalanche photodiode," *IEEE Trans. Electron Devices*, under preparation, 2019.
2. **M. M. Hossain**, J. P. R. David, and M. M. Hayat, "Exact analytical formula for the excess noise factor for mixed carrier injection avalanche photodiodes," *IEEE/OSA J. Lightwave Technol.*, vol. 37, no. 13, pp. 3315-3323, July 2019.
3. **M. M. Hossain**, S. Ray, J. S. Cheong, L. Qiao, A. N. A. P. Baharuddin, M. M. Hella, J. P. R. David, and M. M. Hayat, "Low-noise speed-optimized large area CMOS avalanche photodetector for visible light communication," *IEEE/OSA J. Lightwave Technol.*, vol. 35, no. 11, pp. 2315-2324, June 2017.
4. **M. M. Hossain**, M. A. A. Humayun, M. T. Hasan, A. G. Bhuiyan, A. Hashimoto, and A. Yamamoto, "Proposal of high performance 1.55 μm quantum dot heterostructure laser using InN," *IEICE Trans. Electron.*, vol. E95-C, no. 2, pp. 255-261, Feb. 2012.

CONFERENCE PROCEEDINGS

1. **M. M. Hossain** and M. M. Hayat, "High responsivity double-junction CMOS-compatible avalanche photodiode," *Proc. 29th IEEE Photonics Conference*, Waikoloa, Hawaii, USA, pp. 262-263, Oct. 2-6, 2016.
2. **M. M. Hossain**, P. Zarkesh-Ha and M. M. Hayat, "Linear mode CMOS compatible p-n junction avalanche photodiode with operating voltage below 9V," *Proc. 28th IEEE Photonics Conference*, pp. 436-437, Reston, Virginia, USA, Oct. 4-8, 2015.
3. S. Ray, M. M. Hella, **M. M. Hossain**, P. Zarkesh-Ha, and M. M. Hayat, "Speed optimized large area avalanche photodetector in standard CMOS technology for visible light communication," *Proc. 13th IEEE Sensors 2014*, Valencia, Spain, pp. 2147 - 2150, Nov. 3-5, 2014.
4. **M. M. Hossain**, P. Zarkesh-Ha, J. P. R. David, and M. M. Hayat, "Low voltage CMOS compatible p-n junction avalanche photodiode," *Proc. 27th IEEE Photonics Conference*, La Jolla, San Diego, CA, USA, pp. 170 - 171, Oct. 12-16, 2014.
5. **M. M. Hossain**, J. Ghasemi, P. Zarkesh-Ha, and M. M. Hayat, "Design, modeling and fabrication of a CMOS compatible p-n junction avalanche photodiode," *Proc. 26th IEEE Photonics Conference*, Bellevue, WA, USA, pp. 584-585, Sept. 08-12, 2013.
6. **M. M. Hossain**, M. A. A. Humayun, and A. G. Bhuiyan, "Theoretical characteristics of 1.55 μm InN based quantum dot laser," *Proc. SPIE, Nanoengineering: Fabrication, Properties, Optics, and Devices X*, San Diego, CA, USA, vol. 8816, pp. 88160Z-1, Aug. 25-29, 2013.

AWARDS AND HONORS

- IEEE photonics society student travel grant to attend IEEE Photonics Conference for 2017 and 2018.
- Professional development grant from UNM GPSA for 2016, 2017, and 2018.
- IEEE outstanding graduate engineering student award from IEEE Albuquerque section for 2015.
- SPIE optics and photonics education (OPE) scholarship award for 2014.

LEADERSHIP AND OUTREACH ACTIVITIES

- Associate vice president (AVP) of student membership at IEEE photonics society for 2014 – 2016.
- President: Optical Society of America (OSA)–UNM student chapter for 2014 – 2015.
- Vice president: Optical Society of America (OSA)–UNM student chapter for 2013 – 2014.
- Outreach efforts on LED–sensor artworks for K–12 at different institutions and events around Albuquerque.

REFERENCES

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