

# Curriculum Vitae

## Muhammad Anisuzzaman Talukder

Department of Electrical and Electronic Engineering  
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### RESEARCH INTERESTS

Nanophotonics, bio-photonics, biosensors, photovoltaics, quantum electronics, plasmonics, quantum cascade lasers, and applications of mid-infrared technologies for health and environment.

### EDUCATION

- **Doctor of Philosophy**, Electrical Engineering, May 2010  
University of Maryland, MD 21250, USA  
Dissertation Title: Analysis of self-induced transparency modelocking of quantum cascade lasers.
- **Master of Science**, Electrical Engineering, May 2004  
Bangladesh University of Engineering and Technology, Dhaka 1205, Bangladesh  
Thesis Title: Analysis of self-phase modulation effect on optical WDM system with dispersion compensation.
- **Bachelor of Science**, Electrical Engineering, May 2000  
Bangladesh University of Engineering and Technology, Dhaka 1205, Bangladesh

### PROFESSIONAL / RESEARCH EXPERIENCE

- **Professor**, July 2014 – Present  
**Associate Professor**, July 2011 – July 2014  
**Assistant Professor**, September 2004 – July 2011  
**Lecturer**, February 2001 – September 2004  
Electrical and Electronic Engineering (EEE), Bangladesh University of Engineering and Technology (BUET) – highest ranked University in Bangladesh (<http://www.buet.ac.bd>).
  - Instructing undergraduate and graduate courses.
  - Supervising undergraduate and graduate thesis.
  - Instructed courses include EEE 6403 Quantum Phenomena in Nanostructures and EEE 6503 Laser Theory for Postgraduate students; and EEE 461 Semiconductor Device Theory, EEE 209 Engineering Electromagnetics, EEE 417 Digital and Satellite Communications, EEE 314 Telecommunication Engineering, EEE 305 Measurement and Instrumentation, EEE 263 Electronic Circuits and Devices, and EEE 269 Electrical Drives and Instrumentation for Undergraduate students.
- **Visiting Professor**, June 2018 – Present  
**Visiting Associate Professor**, January 2013 – December 2017  
**Visiting Assistant Professor**, November 2010 – December 2012  
Computer Science and Electrical Engineering (CSEE), University of Maryland, Baltimore County, USA.

- Co-supervising Ph. D. students.
- Pursuing collaborative research.
- Writing joint research proposals.
- **Director**, October 2020 – Present  
Research and Innovation Centre for Science and Engineering (RISE), BUET, Dhaka 1205.
- **Marie Curie Fellow**, October 2016 – September 2018  
School of Electronic and Electrical Engineering, University of Leeds, UK.
  - Worked on proposed TERAULTRA - “Terahertz Ultra-Short Pulses from Self-Induced Transparency Modelocked Quantum Cascade Lasers” project.
- **Research Fellow**, January 2016 – September 2016  
School of Electronic and Electrical Engineering, University of Leeds, UK.
  - Worked on European Commission funded “ULTRAQCL” project for ultra short pulse generation from THz quantum cascade lasers.
- **Honorary Fellow**, September 2013 – August 2015  
Department of Electronic and Information Engineering (EIE), Hong Kong Polytechnic University, Hong Kong.
  - Rendered expert advice.
- **Contractual Research Scientist**, February 2015 – Present  
Banpil Photonics, Inc., California, USA
  - Collaborated in the development of multi-spectral image sensors.
- **Honorary Visiting Academic**, August 2013 – October 2013  
Department of Electrical and Electronic Engineering, School of Engineering and Mathematical Sciences, City University London.
  - Collaborated in research.
- **Research Assistant**, June 2007 – May 2010  
Advisor: Professor Curtis R. Menyuk  
Computer Science and Electrical Engineering (CSEE), UMBC
  - Developed a simulation package for designing quantum cascade lasers (QCLs).
  - Designed QCLs employing novel techniques for performance improvements.
  - Proposed and demonstrated self-induced transparency modelocking of quantum cascade lasers to generate ultra-short (sub-ps) pulses.
  - Explored carrier transport dynamics and heat dissipation dynamics in QCLs.
  - Published technical papers in journals and presented results at conferences.
  - Experienced in C++, MATLAB, and COMSOL programming tools; QCLs testing, mid-IR optoelectronic device characterization, and clean-room nanofabrication.
- **Teaching Assistant**, August 2006 – May 2007  
CSEE, UMBC  
Assisted in theory and conducted laboratory of CMPE 314 Principles of Electronic Circuits.
- **System Engineer**, October 2000 – February 2001  
Grameen Phone Limited – leading Mobile Phone operator in Bangladesh  
(<http://www.grameenphone.com>)

- Planned radio frequency of GSM network with the help of ASTRIX.
- Assigned frequency and other parameters to the Base Transceiver Stations.
- Checked radio network quality and coverage using TEMS GSM 900/98 software.
- **Part-time Faculty**, October 2005 – February 2006  
Stamford University Bangladesh (<http://www.stamforduniversity.edu.bd>)  
Conducted course: Electrical Services Design.
- **Part-time Faculty**, February 2005 – October 2005  
Military Institute of Science and Technology (<http://www.mist-bd.org>)  
Conducted courses: Numerical Techniques, Microprocessor and Interfacing.
- **Part-time Faculty**, July 2001 – October 2003  
Dhaka International University (<http://www.diu.net.bd>)  
Conducted courses: Digital Techniques, Advanced Electronics, and Digital Signal Processing.

### ACADEMIC HONORS AND AWARDS

- Marie Sklodowska-Curie Individual Fellowship 2015 under European Union's Horizon 2020 to carry out research at the University of Leeds, UK for two years.
- Nominated as a High Level Delegate of Bangladesh Government to attend and present a plenary talk at the conference (South Asian Workshop on Optics and Photonics) to commemorate the International Year of Light by UNESCO in IIT, Guwahati, India, November 17–18, 2015.
- Early career travel award to attend The SIAM Conference on Nonlinear Waves and Coherent Structures (NW14), August 11-14, 2014, Cambridge, United Kingdom.
- Invitation and Full support to attend the Winter College on Optics: Fundamentals of Photonics – Theory, Devices and Applications, ICTP, Trieste, Italy, February 10–21, 2014.
- Honorary Fellow, Department of Electronic and Information Engineering, Hong Kong Polytechnic University, Hong Kong (2013-2015).
- Erasmus Mundus Strong-Ties Staff Level Mobility Scholarship 2013, City University London, UK.
- BAS (Bangladesh Academy of Sciences) - TWAS (The Academy of Sciences for the Developing World) Young Scientist Award, 2011. The award was conferred by the Hon'ble Prime Minister of Bangladesh.
- Dr. Fatema Rashid Best Paper Award, International Conference on Electrical and Computer Engineering (ICECE 2010), Dhaka, Bangladesh (2010).
- Significant Research Contributions Award 2008-2009, Mid-Infrared Technologies for Health and the Environment (MIRTHE), National Science Foundation Engineering Research Center (NSF-ERC), (2009).
- Best Ph. D. Research Award 2008-2009, Computer Science and Electrical Engineering, University of Maryland, Baltimore County, Baltimore, MD, USA (2009).
- Second Place Award in Graduate Student Poster Competition 2008, IEEE Baltimore and Washington-Northern Virginia Photonics Society Chapter, Baltimore, MD, USA (2008).
- Student Travel Grant, University of Maryland, Baltimore County, to attend and present a paper in the IEEE Lasers and Electro-Optics Society Annual Meeting, New Port Beach, CA, USA (2008).

- Position in Dean's List (1995–1999), Department of Electrical and Electronic Engineering, Bangladesh University of Engineering and Technology (BUET).
- Dhaka Education Board Scholarship – Talent Pool (1995–2000) for securing the 8th position in Higher Secondary Certificate Examination (~200,000 students participated).
- Dhaka Education Board Scholarship – Talent Pool (1991–1993) for securing 9th position in Secondary School Certificate Examination (~300,000 students participated).

## RESEARCH GRANTS

1. **Title:** Terahertz ultra-short pulses from self-induced transparency modelocked quantum cascade lasers (ULTRATERA)  
**Organization offering the grant:** European Commission under Horizon2020 and Marie-Curie Individual Fellowship  
**Duration:** 2016–2018  
**Fund:** €195,454.80
2. **Title:** Plasmonic photovoltaics for next generation solar cells  
**Organization offering the grant:** Ministry of Education, Bangladesh  
**Duration:** 2013–2016  
**Fund:** BDT 15,00,000.00
3. **Title:** Mid-Infrared sensors for monitoring greenhouse gases  
**Organization offering the grant:** University Grants Commission, Bangladesh  
**Duration:** 2012–2014  
**Fund:** BDT 1,39,99,000.00
4. **Title:** Modeling gain dynamics of quantum cascade lasers  
**Organization offering the grant:** MIRTHE, National Science Foundation-Engineering Research Center, USA  
**Duration:** 2013–2014  
**Fund:** USD 43,109.00
5. **Title:** Efficient photovoltaic energy conversion for solar cells toward sustainable future  
**Organization offering the grant:** Ministry of Science and Technology, Bangladesh  
**Duration:** 2012–2013  
**Fund:** BDT 10,00,000.00
6. **Title:** Active modelocking of quantum cascade lasers  
**Organization offering the grant:** National Science Foundation, USA  
**Duration:** 2012–2013  
**Fund:** USD 47,375.00
7. **Title:** Active modelocking of quantum cascade lasers and quantum coherence  
**Organization offering the grant:** MIRTHE, National Science Foundation-Engineering Research Center, USA  
**Duration:** 2011–2013  
**Fund:** USD 93,317.00
8. **Title:** Modelocking of quantum cascade lasers and quantum coherence effects  
**Organization offering the grant:** MIRTHE, National Science Foundation-Engineering Research Center, USA  
**Duration:** 2010–2011  
**Fund:** USD 50,717.00

## **PRESENT AND PAST RESEARCH COLLABORATION**

- Prof. Curtis R. Menyuk, Department of Computer Science and Electrical Engineering, University of Maryland, Baltimore County, USA.
- Dr. Achyut K. Dutta, Banpil Photonics Inc., CA, USA.
- Prof. Anthony Johnson, Department of Computer Science and Electrical Engineering, University of Maryland, Baltimore County, USA.
- Prof. Fow-Sen Choa, Department of Computer Science and Electrical Engineering, University of Maryland, Baltimore County, USA.
- Prof. Claire Gmachl, Department of Electrical Engineering, Princeton University, USA.
- Dr. Olukayode Okusaga, Army Research Laboratory, USA.
- Prof. B. M. Azizur Rahman, Electrical and Electronic Engineering, City University London, UK.

## **PUBLICATIONS IN INTERNATIONAL REFEREED JOURNALS**

1. Z. Azad, M. S. Islam, and **M. A. Talukder**, “Mode-resolved analysis of a planar multi-layer plasmonic nanolaser,” *Optics Communications* **482**, 126614 (2020).  
<https://doi.org/10.1016/j.optcom.2020.126614>.
2. M. M. Hossain and **M. A. Talukder**, “Optical magnetism in surface plasmon resonance based sensors for enhanced performance,” *Plasmonics* (2020). <https://doi.org/10.1007/s11468-020-01316-2>.
3. **M. A. Talukder**, “Relating diffusion-weighted magnetic resonance imaging of brain white matter to cognitive processing-speed deficits in schizophrenia,” *Biomedical Physics and Engineering Express* **6**, 055007 (2020), <https://doi.org/10.1088/2057-1976/aba3ba>.
4. Z. Omair and **M. A. Talukder**, “Sensitivity analysis of gold nanorod biosensors for single molecule detection,” *Plasmonics* (2019). <https://doi.org/10.1007/s11468-019-00946-5>.
5. **M. A. Talukder**, C. R. Menyuk, and Y. Kostov, “Distinguishing between whole cells and cell debris using surface plasmon coupled emission,” *Biomedical Optics Express* **9**, 1977–1991 (2018).
6. Z. Ahmed and **M. A. Talukder**, “An efficient and directional optical Tamm state assisted plasmonic nanolaser with broad tuning range,” *Journal of Physics Communications* **2**, 045016 (2018).
7. A. Das and **M. A. Talukder**, “Theoretical analysis of bimetallic nanorod dimer biosensors for label-free molecule detection,” *AIP Advances* **8**, 025302 (2018).
8. S. Z. Uddin and **M. A. Talukder**, “Imaging of cell membrane topography using Tamm plasmon coupled emission,” *Biomedical Physics and Engineering Express* **3**, 065005 (2017). The paper has been the feature article of the issue, among the 2017 highlights of the journal, and one of the “most read” articles of the journal.
9. S. Z. Uddin and **M. A. Talukder**, “Two-dimensional materials for improved resolution in total internal reflection fluorescence microscopy,” *Materials Research Express* **4**, 096203 (2017).
10. M. Roy and **M. A. Talukder**, “Terahertz quantum cascade laser with an X-valley-based injector,” *Journal of Applied Physics* **121**, 133104 (2017).

11. S. E. J. Mahabadi, Y. Hu, **M. A. Talukder**, T. F. Carruthers, and C. R. Menyuk, “A comprehensive model of gain recovery due to unipolar electron transport after a short optical pulse in quantum cascade lasers,” *Journal of Applied Physics* **120**, 154502 (2016).
12. S. Z. Uddin, M. R. Tanvir, and **M. A. Talukder**, “A proposal and an analysis of an enhanced surface plasmon coupled emission structure for single molecule detection,” *Journal of Applied Physics* **119**, 204701 (2016).
13. K. Mashooq and **M. A. Talukder**, “Management of light absorption in extraordinary optical transmission based ultra-thin-film tandem solar cells,” *Journal of Applied Physics* **119**, 193101 (2016).
14. M. A. Awal, Z. Ahmed, and **M. A. Talukder**, “An efficient plasmonic photovoltaic structure with silicon strip-loaded geometry,” *Journal of Applied Physics* **117**, 063109 (2015).
15. D. Guo, H. Cai, **M. A. Talukder**, X. Chen, A. M. Johnson, J. B. Khurgin, and F.-S. Choa, “Near-infrared induced optical quenching effects on mid-infrared quantum cascade lasers,” *Applied Physics Letters* **104**, 251102 (2014).
16. **M. A. Talukder** and C. R. Menyuk, “Quantum coherent saturable absorption for mid-infrared ultra-short pulses,” *Optics Express* **22**, 15608 (2014).
17. **M. A. Talukder** and C. R. Menyuk, “Calculation of microscopic parameters of a self-induced transparency modelocked quantum cascade laser,” *Optics Communications* **295**, 115 (2013).
18. S. S. Shimu, A. Docherty, **M. A. Talukder**, and C. R. Menyuk, “Suppression of spatial hole burning and pulse stabilization for actively modelocked quantum cascade lasers using quantum coherent absorption,” *Journal of Applied Physics* **113**, 053106 (2013).
19. **M. A. Talukder** and C. R. Menyuk, “Temperature-dependent coherent carrier transport in quantum cascade lasers,” *New Journal of Physics* **13**, 083027 (2011).
20. **M. A. Talukder**, “Modeling of gain recovery of quantum cascade lasers,” *Journal of Applied Physics* **109**, 033104 (2011) (also published in March 2011 issue of *Virtual Journal of Ultrafast Science*).
21. **M. A. Talukder** and C. R. Menyuk, “Self-induced transparency modelocking of quantum cascade lasers in the presence of saturable nonlinearity and group velocity dispersion,” *Optics Express* **18**, 5639 (2010).
22. **M. A. Talukder** and C. R. Menyuk, “Effects of backward-propagating waves and lumped mirror losses on self-induced transparency in quantum cascade lasers,” *Applied Physics Letters* **95**, 071109 (2009).
23. **M. A. Talukder** and C. R. Menyuk, “Analytical and computational study of self-induced transparency modelocking in quantum cascade lasers,” *Physical Review A* **79**, 063841 (2009).
24. C. R. Menyuk and **M. A. Talukder**, “Self-induced transparency modelocking of quantum cascade lasers,” *Physical Review Letters* **102**, 023903 (2009) (also published in February 2009 issue of *Virtual Journal of Ultrafast Science*).
25. **M. A. Talukder** and M. N. Islam, “A long-haul wavelength division multiplexed system using standard single-mode fiber in presence of self-phase modulation,” *Optik - International Journal for Light and Electron Optics* **120**, 356 (2009).
26. **M. A. Talukder** and M. N. Islam, “Performance of bi-end compensation in a wavelength-division multiplexed system considering the effect of self phase modulation,” *Optical Engineering* **44**, 115005 (2005).

## **PUBLICATIONS IN CONFERENCE PROCEEDINGS**

1. **M. A. Talukder**, “Photovoltaic cells based on plasmonic structures,” (Invited) Micro- and Nanotechnology Sensors, Systems, and Applications IX in SPIE Commercial + Scientific Sensing and Imaging, Anaheim, CA, USA (2017).
2. **M. A. Talukder**, “Ultra-short pulses from quantum cascade lasers for terahertz time domain spectroscopy,” (Invited) Image Sensing Technologies: Materials, Devices, Systems, and Applications IV in SPIE Commercial + Scientific Sensing and Imaging, Anaheim, CA, USA (2017).
3. K. Mashooq and **M. A. Talukder**, “Effects of intermediate metal layer in ultra-thin-film tandem solar cells,” Photonics West, San Francisco, CA, USA (2017).
4. **M. A. Talukder**, C. R. Menyuk, and Y. Kostov, “Distinguishing between whole cells and cell debris using surface plasmon coupled emission,” Photonics West, San Francisco, CA, USA (2017).
5. S. Z. Uddin and **M. A. Talukder**, “Reduction of detection volume in total internal reflection fluorescence microscopy using graphene,” 9th International Conference on Electrical and Computer Engineering (ICECE), Dhaka, Bangladesh (2016).
6. **M. A. Talukder**, P. Dean, E. Linfield, A. G. Davies, “Cavity-induced slow gain recovery in pump-probe experiments of quantum cascade lasers,” International Quantum Cascade Lasers School and Workshop (IQCLSW), Cambridge, UK (2016).
7. S. Z. Uddin, M. R. Tanvir, S. Hassan, and **M. A. Talukder**, “Surface plasmon coupled emission enhancement with nanoparticles in the metal layer,” IEEE International Conference on Photonics (ICP), Sarawak, Malaysia (2016).
8. S. Hassan and **M. A. Talukder**, “Quantum cascade thermo photovoltaic structures for broadband energy conversion,” IEEE International Conference on Photonics (ICP), Sarawak, Malaysia (2016).
9. S. Hassan and **M. A. Talukder**, “Increased radiation absorption in thermophotovoltaic quantum cascade structures,” IEEE International Conference on Telecommunication and Photonics (ICTP), Dhaka, Bangladesh (2015).
10. M. R. K. Rachi, N. Jawad, and **M. A. Talukder**, “Enhancement of light absorption in a thin-film tandem solar cell with an intermediate layer of metal strips,” IEEE Photonics Conference (IPC 2015), Virginia, USA (2015).
11. S. Z. Uddin, M. R. Tanvir, and **M. A. Talukder**, “Surface plasmon coupled emission with fluorescent molecules as broadband dipoles,” IEEE Photonics Conference (IPC 2015), Virginia, USA (2015).
12. M. S. H. Sohel, A. F. M. S. Haq, and **M. A. Talukder**, “Design and simulation of three wavelength terahertz GaN quantum cascade laser,” 8th International Conference on Electrical and Computer Engineering (ICECE), Dhaka, Bangladesh (2014).
13. M A Awal, Zabir Ahmed, and **M. A. Talukder**, “Semi-analytical model for enhanced surface plasmon polaritons in a corrugated interface,” 8th International Conference on Electrical and Computer Engineering (ICECE), Dhaka, Bangladesh (2014).
14. **M. A. Talukder** and C. R. Menyuk, “Suppression of spatial hole-burning and sub-picosecond pulses from two-section quantum cascade lasers,” IEEE Photonics Conference (IPC 2014), San Diego, CA, USA (2014).

15. G. M. I. Hossain and **M. A. Talukder**, “Light management in tandem solar cell with intermediate plasmonic electrode,” IEEE Photonics Conference (IPC 2014), San Diego, CA, USA (2014).
16. **M. A. Talukder** and C. R. Menyuk, “Modelocking quantum cascade lasers using quantum coherent saturable absorption,” SIAM Conference on Nonlinear Waves and Coherent Structures, University of Cambridge, UK (2014).
17. C. R. Menyuk and **M. A. Talukder**, “Solitons, self-induced transparency, and quantum cascade lasers,” SIAM Conference on Nonlinear Waves and Coherent Structures, University of Cambridge (2014).
18. **M. A. Talukder**, “Quantum coherent saturable absorption for mid-infrared ultra-short pulses,” Winter College on Optics: Fundamentals of Photonics - Theory, Devices and Applications, ICTP, Trieste, Italy (2014).
19. S. N. Sourav, A. F. M. S. Haq, and **M. A. Talukder**, “Wideband photovoltaic energy conversion using group III-nitrides,” International Conference on Advances in Electrical Engineering (ICAEE), Dhaka, Bangladesh (2013).
20. **M. A. Talukder**, “Ultra-short pulses from quantum cascade structures with distributed gain and absorption,” IEEE Photonics Conference (IPC 2013), Washington, USA (2013).
21. M. Ahmed and **M. A. Talukder**, “Quantum cascade structures for efficient thermo-photovoltaic energy conversion,” Photonics Global Conference (PGC 2012), Singapore (2012).
22. R. Faria, O. Hassan, F. Hayee, M. S. H. Sohel, A. Ahmed, and **M. A. Talukder**, “Study of design-dependent electroluminescence linewidth of quantum cascade lasers,” Photonics Global Conference (PGC 2012), Singapore (2012).
23. A. Ahmed, O. Hassan, M. S. H. Sohel, F. Hayee, R. Faria, and **M. A. Talukder**, “Quantum cascade laser wavelength tuning due to temperature-dependent index of refraction,” Photonics Global Conference (PGC 2012), Singapore (2012).
24. **M. A. Talukder**, “Gain recovery dynamics of quantum cascade lasers,” Photonics Global Conference (PGC 2012), Singapore (2012).
25. A. Ahmed, O. Hassan, M. S. H. Sohel, F. Hayee, R. Faria, and **M. A. Talukder**, “Short pulse dynamics in quantum cascade lasers,” 7th International Conference on Electrical and Computer Engineering (ICECE 2012), Dhaka, Bangladesh (2012).
26. M. Ahmed and **M. A. Talukder**, “Intersubband transition based efficient photovoltaic energy conversion,” 7th International Conference on Electrical and Computer Engineering (ICECE 2012), Dhaka, Bangladesh (2012).
27. O. Hassan, R. Faria, F. Hayee, M. S. H. Sohel, A. Ahmed, and **M. A. Talukder**, “Bias dependence of gain spectrum and output emission characteristics of two phonon resonance design quantum cascade lasers,” 7th International Conference on Electrical and Computer Engineering (ICECE 2012), Dhaka, Bangladesh (2012).
28. F. Hayee, R. Faria, O. Hassan, M. S. H. Sohel, A. Ahmed, and **M. A. Talukder**, “Bias-dependent intersubband electroluminescence linewidth of quantum cascade lasers,” 7th International Conference on Electrical and Computer Engineering (ICECE 2012), Dhaka, Bangladesh (2012).
29. M. S. H. Sohel, O. Hassan, A. Ahmed, F. Hayee, R. Faria, and **M. A. Talukder**, “Effect of temperature on quantum cascade laser emission as a function of cavity length,” 7th International Conference on Electrical and Computer Engineering (ICECE 2012), Dhaka, Bangladesh (2012).



30. S. S. Shimu, A. Docherty, **M. A. Talukder**, and C. R. Menyuk, “Theoretical demonstration of stabilization of active modelocking in quantum cascade lasers with quantum coherent absorption,” IEEE Photonics Conference (IPC 2012), California, USA (2012).
31. S. S. Shimu, A. Docherty, **M. A. Talukder**, and C. R. Menyuk, “Stabilization of active modelocking in quantum cascade lasers with quantum coherent absorption,” MIRTHE-IROn-SensorCAT Virtual Conference, Princeton University, Princeton, USA (2012).
32. **M. A. Talukder** and C. R. Menyuk, “Temperature-sensitive gain recovery dynamics of quantum cascade lasers,” International Conference on Intersubband Transitions in Quantum Wells (ITQW 2011), Sardinia, Italy (2011).
33. S. S. Shimu, A. Docherty, **M. A. Talukder**, and C. R. Menyuk, “Investigation of methods for improving the stability of active modelocking in quantum cascade lasers,” Mid-Infrared Technologies for Health and the Environment (MIRTHE) Summer Workshop, Princeton University, Princeton, USA (2011).
34. **M. A. Talukder** and C. R. Menyuk, “Comprehensive quantum cascade lasers carrier transport modeling,” MIRTHE NSF Site Visit, Princeton University, Princeton, USA (2011).
35. **M. A. Talukder** and C. R. Menyuk, “Gain to absorption ratio of self-induced transparency modelocked quantum cascade lasers,” Conference on Lasers and Electro-Optics (CLEO 2011), Baltimore, USA (2011).
36. **M. A. Talukder** and C. R. Menyuk, “Inefficient coherent carrier transport in quantum cascade lasers at high temperature,” Conference on Lasers and Electro-Optics (CLEO 2011), Baltimore, USA (2011).
37. **M. A. Talukder** and C. R. Menyuk, “Quantum coherence times in quantum cascade lasers,” MIRTHE-IROn-SensorCAT Virtual Conference, Princeton University, Princeton, USA (2011).
38. **M. A. Talukder**, “Gain recovery modeling of quantum cascade lasers,” International Conference on Electrical and Computer Engineering (ICECE 2010), Dhaka, Bangladesh (2010) (won the best paper award).
39. **M. A. Talukder**, “Role of coherence time on carrier transport of quantum cascade lasers,” Photonics Global Conference (PGC 2010), Singapore (2010).
40. C. R. Menyuk and **M. A. Talukder**, “A completely new way to make ultra-short pulses at mid-infrared wavelengths,” Computer Science and Electrical Engineering Research Review, University of Maryland Baltimore County (2010).
41. **M. A. Talukder**, “A novel approach to create ultra-short mid-IR pulses,” Graduate Research Conference (GRC 2010), University of Maryland, Baltimore County, Baltimore, MD, USA (2010).
42. C. R. Menyuk and **M. A. Talukder**, “Self-induced transparency modelocking in quantum cascade lasers,” SIAM Conference on Nonlinear Waves and Coherent Structures (SIAM-NW10), Philadelphia, Pennsylvania, USA (2010).
43. **M. A. Talukder** and C. R. Menyuk, “Self-induced transparency modelocking with saturable nonlinearity and group velocity dispersion,” Conference on Lasers and Electro-Optics (CLEO 2010), San Jose, CA (2010).
44. **M. A. Talukder** and C. R. Menyuk, “Saturable nonlinearity and group velocity dispersion limits for self-induced transparency modelocking,” Mid-Infrared Technologies for Health and the Environment (MIRTHE) National Science Foundation (NSF) Site Visit, Princeton University, Princeton, NJ, USA (2010).

45. **M. A. Talukder** and C. R. Menyuk, “Stability limits of self-induced transparency modelocking of quantum cascade lasers in bi-directional propagation,” International Conference on Intersubband Transitions in Quantum Wells (ITQW 2009), Montreal, Canada (2009).
46. **M. A. Talukder** and C. R. Menyuk, “Carrier transport through quantum cascade lasers: Effects of coherence times,” Mid-Infrared Technologies for Health and the Environment (MIRTHE) Summer Workshop, New York, USA (2009).
47. **M. A. Talukder** and C. R. Menyuk, “Quantum cascade laser structures for self-induced transparency modelocking,” Mid-Infrared Technologies for Health and the Environment (MIRTHE) National Science Foundation (NSF) Site Visit, Princeton University, Princeton, NJ, USA (2009).
48. **M. A. Talukder** and C. R. Menyuk, “Stability in self-induced transparency modelocking as system parameters vary,” IEEE Photonics Society Annual Meeting, New Port Beach, CA, USA (2008).
49. **M. A. Talukder** and C. R. Menyuk, “Quantum cascade laser structures for self-induced transparency modelocking,” International Quantum Cascade Lasers School and Workshop, Monte Verita, Switzerland (2008).
50. **M. A. Talukder** and C. R. Menyuk, “Stability of self-induced transparency modelocking in quantum cascade lasers,” Mid-Infrared Technologies for Health and the Environment (MIRTHE) Summer Workshop, Johns Hopkins University, Baltimore, USA (2008).
51. **M. A. Talukder**, C. R. Menyuk, “Modelocking in quantum cascade lasers using self-induced transparency,” IEEE Photonics Society Annual Poster Competition, Baltimore and Washington-Northern Virginia Chapter, Baltimore, USA (2008) (won the 1st runner-up prize).
52. **M. A. Talukder**, F.-S. Choa, C. R. Menyuk, K. J. Franz, S. S. Howard, and C. F. Gmachl, “Novel heat removal waveguide structure for high performance quantum cascade lasers,” Conference on Lasers and Electro-Optics (CLEO 2008), San Jose, CA, USA (2008).
53. **M. A. Talukder**, F.-S. Choa, and C. R. Menyuk, “High power quantum cascade laser with buried heterostructure,” Mid-Infrared Technologies for Health and the Environment (MIRTHE) National Science Foundation (NSF) Site Visit, Princeton University, Princeton, NJ, USA (2008).
54. **M. A. Talukder**, C. R. Menyuk, and F.-S. Choa, “Comprehensive quantum cascade laser model and applications,” Mid-Infrared Technologies for Health and the Environment (MIRTHE) National Science Foundation (NSF) Site Visit, Princeton University, Princeton, NJ, USA (2008).
55. **M. A. Talukder**, Fow-Sen Choa, and C. R. Menyuk, “Structure design for quantum cascade laser core temperature reduction,” Mid-Infrared Technologies for Health and the Environment (MIRTHE) Summer Workshop, Princeton University, Princeton, NJ, USA (2007).
56. **M. A. Talukder** and M. N. Islam, “Effect of self-phase modulation on optical communication system in presence of dispersion compensation,” International Conference on Electrical and Computer Engineering (ICECE 2004), Dhaka, Bangladesh (2004).
57. **M. A. Talukder** and M. N. Islam, “Dependence of self-phase modulation impairments on input pulse shape over a dispersion-compensated transmission link using standard single mode fiber,” IEEE 8th International Multitopic Conference (INMIC 2004), Lahore, Pakistan (2004).

## PRESENTATIONS

### CONTRIBUTED

1. Presented “Quantum coherent saturable absorption for mid-infrared ultra-short pulses” in the Winter College on Optics: Fundamentals of Photonics - Theory, Devices and Applications, ICTP, Trieste, Italy (2014).
2. Presented “Ultra-short pulses from quantum cascade structures with distributed gain and absorption” in the IEEE Photonics Conference (IPC 2013), Washington, USA (2013).
3. Presented “Gain recovery dynamics of quantum cascade lasers” in the Photonics Global Conference (PGC 2012), Singapore (2012).
4. Presented “Quantum cascade structures for efficient thermo-photovoltaic energy conversion” in the Photonics Global Conference (PGC 2012), Singapore (2012).
5. Presented “Theoretical demonstration of stabilization of active modelocking in quantum cascade lasers with quantum coherent absorption” in the IEEE Photonics Conference (IPC 2012), California, USA (2012).
6. Presented “Temperature-sensitive gain recovery dynamics of quantum cascade lasers” in the International Conference on Intersubband Transitions in Quantum Wells (ITQW 2011), Sardinia, Italy (2011).
7. Presented “Gain to absorption ratio of self-induced transparency modelocked quantum cascade lasers” in the Conference on Lasers and Electro-Optics (CLEO 2011), Baltimore, USA (2011).
8. Presented “Inefficient coherent carrier transport in quantum cascade lasers at high temperature” in the Conference on Lasers and Electro-Optics (CLEO 2011), Baltimore, USA (2011).
9. Presented “Gain recovery modeling of quantum cascade lasers” in the International Conference on Electrical and Computer Engineering (ICECE 2010), Dhaka, Bangladesh (2010) (won the best paper award).
10. Presented “A novel approach to create ultra-short mid-IR pulses” in the Graduate Research Conference (GRC 2010), University of Maryland, Baltimore County, Baltimore, MD, USA (2010).
11. Presented “Self-induced transparency modelocking with saturable nonlinearity and group velocity dispersion” in the Conference on Lasers and Electro-Optics (CLEO 2010), San Jose, CA (2010).
12. Presented “Saturable nonlinearity and group velocity dispersion limits for self-induced transparency modelocking” in the Mid-Infrared Technologies for Health and the Environment (MIRTHE) National Science Foundation (NSF) Site Visit, Princeton University, Princeton, NJ, USA (2010).
13. Presented “Stability limits of self-induced transparency modelocking of quantum cascade lasers in bi-directional propagation” in the International Conference on Intersubband Transitions in Quantum Wells (ITQW 2009), Montreal, Canada (2009).
14. Presented “Carrier transport through quantum cascade lasers: Effects of coherence times” in the Mid-Infrared Technologies for Health and the Environment (MIRTHE) Summer Workshop, New York, USA (2009).
15. Presented “Quantum cascade laser structures for self-induced transparency modelocking” in the Mid-Infrared Technologies for Health and the Environment (MIRTHE) National Science Foundation (NSF) Site Visit, Princeton University, Princeton, NJ, USA (2009).
16. Presented “Stability in self-induced transparency modelocking as system parameters vary” in the IEEE Photonics Society Annual Meeting, New Port Beach, CA, USA (2008).
17. Presented “Quantum cascade laser structures for self-induced transparency modelocking” in the International Quantum Cascade Lasers School and Workshop, Monte Verita, Switzerland (2008).

18. Presented “Stability of self-induced transparency modelocking in quantum cascade lasers” in the Mid-Infrared Technologies for Health and the Environment (MIRTHE) Summer Workshop, Johns Hopkins University, Baltimore, USA (2008).
19. Presented “Modelocking in quantum cascade lasers using self-induced transparency” in the IEEE Photonics Society Annual Poster Competition, Baltimore and Washington-Northern Virginia Chapter, Baltimore, USA (2008) (won the 1st runner-up prize).
20. Presented “Novel heat removal waveguide structure for high performance quantum cascade lasers” in the Conference on Lasers and Electro-Optics (CLEO 2008), San Jose, CA, USA (2008).
21. Presented “High power quantum cascade laser with buried heterostructure” in the Mid-Infrared Technologies for Health and the Environment (MIRTHE) National Science Foundation (NSF) Site Visit, Princeton University, Princeton, NJ, USA (2008).
22. Presented “Comprehensive quantum cascade laser model and applications” in the Mid-Infrared Technologies for Health and the Environment (MIRTHE) National Science Foundation (NSF) Site Visit, Princeton University, Princeton, NJ, USA (2008).
23. Presented “Structure design for quantum cascade laser core temperature reduction” in the Mid-Infrared Technologies for Health and the Environment (MIRTHE) Summer Workshop, Princeton University, Princeton, NJ, USA (2007).
24. Presented “Effect of self-phase modulation on optical communication system in presence of dispersion compensation” in the International Conference on Electrical and Computer Engineering (ICECE 2004), Dhaka, Bangladesh (2004).
25. Presented “Dependence of self-phase modulation impairments on input pulse shape over a dispersion-compensated transmission link using standard single mode fiber” in the IEEE 8th International Multitopic Conference (INMIC 2004), Lahore, Pakistan (2004).

## **INVITED**

1. Presented “Plasmonic photovoltaics, biosensing, and microscopy,” (Invited) in University of California Irvine, CA, USA (2017).
2. Presented “Photovoltaic cells based on plasmonic structures,” (Invited) SPIE Commercial + Scientific Sensing and Imaging, Anaheim, CA, USA (2017).
3. Presented “Ultra-short pulses from quantum cascade lasers for terahertz time domain spectroscopy,” (Invited) SPIE Commercial + Scientific Sensing and Imaging, Anaheim, CA, USA (2017).
4. Presented “Literary contents for conducting high impact research in engineering: challenges and prospects in the context of Bangladesh,” (Invited) in Seminar Series organized by the Library of BUET (2015).
5. Presented “Mid-infrared light for health and environment,” (Invited) in the South Asian Workshop on Optics and Photonics, Indian Institute of Technology Guwahati, India (2015).
6. Presented “Creating and controlling shades of light for health and environment,” (Invited) in the International Conference on Material Chemistry, Sylhet, Bangladesh (2014).
7. Presented “Creating and controlling shades of light for health and environment,” (Invited) in the International Conference on Material Chemistry, Sylhet, Bangladesh (2014).

8. Presented “Modelocking quantum cascade lasers using quantum coherent saturable absorption” (Invited) in the SIAM Conference on Nonlinear Waves and Coherent Structures, University of Cambridge, UK (2014).
9. Presented “The quantum coherence and a novel approach to create ultra-short pulses in quantum cascade lasers” (Invited) in a Seminar organized by BUET and IEEE Bangladesh Section, Dhaka (2013).
10. Presented “Quantum coherence and gain recovery dynamics in quantum cascade lasers” (Invited) in a Seminar organized by the Princeton University, Princeton, USA (2010).
11. Presented “Quantum cascade lasers: The ultra-fast dynamics” (Invited) in a Seminar organized by BUET and IEEE Electron Devices Society – Bangladesh Chapter, Dhaka (2009).
12. Presented “Quantum cascade lasers: The art of band-structure engineering” (Invited) in a Seminar organized by East-West University Bangladesh and IEEE Electron Devices Society – Bangladesh Chapter, Dhaka (2009).
13. Presented “Quantum cascade lasers, modelocking, and self-induced transparency” (Invited) in Electrical Engineering Graduate Seminar, University of Maryland, Baltimore County, Baltimore, MD, USA (2009).
14. Presented “Analytical and computational study of self-induced transparency mode-locking in quantum cascade lasers” (Invited) in Computer Science and Electrical Engineering Research Review, University of Maryland, Baltimore County, Baltimore, MD, USA (2009).
15. Presented “Quantum cascade laser: Design and numerical characterization” (Invited) in Electrical Engineering Graduate Seminar, University of Maryland, Baltimore County, Baltimore, MD, USA (2008).

#### **PATENT AWARDED**

- C. R. Menyuk and **M. A. Talukder**, “Passively modelocked quantum cascade lasers,” United States Patent No.: US 7,940,818 B2, May 10, 2011.

#### **PATENT APPLICATION FILED**

- **M. A. Talukder**, P. Dean, E. H. Linfield, and A. G. Davies, “Quantum cascade laser,” United Kingdom Patent Application No.: 1814766.0, Filing date: 11 September 2018.
- **M. A. Talukder** and C. R. Menyuk, “Ultra-short pulses from quantum cascade structures with distributed gain and absorption,” United States Patent Application No.: 62031225, Filing date: 31 July 2014.

#### **OTHERS**

1. **M. A. Talukder**, C. R. Menyuk, and Fow-Sen Choa, “A comprehensive quantum cascade laser model,” <http://www.umbc.edu/photronics/software>.
2. **M. A. Talukder**, C. R. Menyuk, and Fow-Sen Choa, “Quantum cascade laser (QCL) model simulation package,” <http://www.umbc.edu/photronics/software>.

#### **JOURNAL REFEREE**

- Nature Scientific Reports, Optics Express, Optics Letters, Photonics Technology Letters, ACS Applied Energy Materials

## **PROFESSIONAL MEMBERSHIPS**

- Senior Member, Institute of Electrical and Electronic Engineers (IEEE)
- Senior Member, Photonics Society, IEEE
- Senior Member, Electron Devices Society, IEEE
- Member, The Optical Society (OSA)
- Member, American Physical Society (APS)
- Member, Institute of Engineers, Bangladesh (IEB)
- Member, Society of Photo-Optical Instrumentation Engineers (SPIE, 2005–2006)

## **RELATED PROFESSIONAL ACTIVITIES**

- President, International Electrotechnical Commission (IEC) Bangladesh National Committee, 2019–2021.
- Vice Chair, Executive Committee, IEEE Electron Devices/Solid State Circuits Society (ED/SSCS), Bangladesh Chapter, 2019–2020.
- Technical Co-chair, IEEE International Conference of Telecommunication and Photonics (ICTP), December, 2019, Dhaka, Bangladesh.
- Member, Organizing Committee, International Conference on Electrical and Computer Engineering (ICECE), December, 2018, Dhaka, Bangladesh.
- Member, Executive Committee, Optical Metrology Technical Group of the OSA, 2018–2019.
- Technical Program Committee Member, International Conference on Micro-Electronics and Telecommunication Engineering (ICMETE-2016), 22–23 September, 2016, Delhi, India (technically sponsored by IEEE EDS).
- Vice Chair, Executive Committee, IEEE Electron Devices/Solid State Circuits Society (ED/SSCS), Bangladesh Chapter, 2015.
- Chair, “Session on Photonics,” 8th International Conference on Electrical and Computer Engineering, Dhaka, December, 2014.
- Chair, “Seminar of The Fascinating World of Sensors,” 10 March 2014, BUET, Dhaka, Bangladesh.
- Chair, “Seminar on Wireless Cellular Network,” 5 February 2014, BUET, Dhaka, Bangladesh.
- Chair, “Seminar on Towards Realizing a Tandem Plasmonic Solar Cell: The Impact of Intermediate Metal Thickness,” 25 January 2014, BUET, Dhaka, Bangladesh.
- Member, Technical Program Committee, 8th International Conference on Electrical and Computer Engineering, Dhaka, December, 2014.
- Chair, “Introduction to Quantum Cascade Detector Modeling and Temperature Effects on Performance Parameters,” 15 December 2013, BUET, Dhaka, Bangladesh.
- Chair, “Workshop on Mid-Infrared Sources and Detectors for Sensing Greenhouse Gases,” 31 July 2013, BUET, Dhaka, Bangladesh.

- Member, Consultants Team for “Fire and Electrical Safety Assessment for Ready-Made Garments Factories in Bangladesh,” a project undertaken by International Labor Organization (ILO), 2013–2014.
- Editor, International Journal of Practical Electronics, Scientific Publishing Corporation, Greifswalder Platz 7,28239 Bremen, Germany, 2013–Present.
- Member, Executive Committee, IEEE Electron Devices/Solid State Circuits Society (ED/SSCS), Bangladesh Chapter, 2013–2014.
- Chair, Technical Sub-Committee for procurement of Air Conditioners for the sub-project (G4, CP-2091) under Higher Education Quality Enhancement Project (HEQEP), 2013.
- Chair, Technical Sub-Committee for procurement of Server Computer, Laptop Computers, Network Switch, and Softwares for the sub-project (CP-2091) under Higher Education Quality Enhancement Project (HEQEP), 2013.
- Chair, Technical Sub-Committee for procurement of Computers, Printers, and UPS for the sub-project (G2, CP-2091) under Higher Education Quality Enhancement Project (HEQEP), 2013.
- Member, Consultants Team for “Executive SCADA for Bangladesh Power Development Board,” 2013.
- Reviewer, University Grants Commission of Bangladesh research project proposal for grants, 2012–2014.
- Member, Consultants Team for “Light and Sound Show for Lalbagh Fort” work undertaken by the department of Archaeology of the Government of Bangladesh, 2012–2013.
- Member, Review Committee for the course on Nanodevices for the Glass & Ceramics Engineering Department of the Bangladesh University of Engineering and Technology, 2012.
- Coordinator, Bureau of Research, Testing, and Consultation, Department of Electrical and Electronic Engineering, Bangladesh University of Engineering and Technology, March, 2012 – April, 2012.
- Member Secretary, Technical Committee, International Conference on Electrical and Computer Engineering (ICECE 2012), Dhaka, Bangladesh (2012).
- Membership Development Coordinator, IEEE Electron Devices Society, Bangladesh Chapter (2011).
- Member, Selection Board for the recruitment of Assistant Engineers for Bangladesh Chemical Industries Corporations (BCIC) (2010).
- Member, Board of Undergraduate Studies (BUGS), Department of Electrical and Electronic Engineering, Bangladesh University of Engineering and Technology (2001 to date).
- Member, Board of Undergraduate Studies (BUGS), Department of Electrical and Electronic Engineering, Bangladesh University of Engineering and Technology (2001 to date).
- Member, Organizing Committee, International Conference on Electrical and Computer Engineering (ICECE 2006), Dhaka, Bangladesh (2006).
- Member, Committee for Industrial Training for Electrical and Electronic Engineering undergraduate students, Bangladesh University of Engineering and Technology (2006).
- Member, Bureau of Research, Testing, and Consultation (BRTC) of the Department of Electrical and Electronic Engineering, Bangladesh University of Engineering and Technology (2004 to date).

- Member, Selection Board for the recruitment of Sub-Inspector for Telecom Unit, Bangladesh Police (2006).
- Member, Sub-Committee for the preparation of tender documents for the purchase of 800 MHz Digital trunking system: Walky-talky sets, fixed sets, and microwave link for Rapid Action Battalion (RAB), Bangladesh (2006).
- Member, Performance Acceptance Committee for 800 MHz Digital and Secure Capable Trunked Wireless Communication System for Rapid Action Battalion (RAB), Bangladesh (worth of approximately USD 2,500,000) (2005-2006).
- Project Organizer, Bangladesh Telegraph and Telephone Board (BTTB) billing project (worth of approximately BDT 200,00,000), 2001.

## **WORKSHOPS / SHORT COURSES**

- *Presentation Skills*, University of Leeds, UK, April 30 (2018).
- *Ethics and Ethical Review Training*, University of Leeds, UK, April 11 (2018).
- *Introduction to Unix for HPC*, University of Leeds, UK, June 21 (2016).
- *Matlab Advanced*, University of Leeds, UK, April 14–15 (2016).
- *Training in Cryogenic Safety*, University of Leeds, UK, April 11 (2016).
- *Workshop on Silicon Photonics Device Design and Fabrication*, IEEE Photonics Conference (IPC 2014), San Diego, CA, USA (2014).
- *Winter College on Optics: Fundamentals of Photonics - Theory, Devices and Applications*, ICTP, Trieste, Italy, February 10–21 (2014).
- *Training-Workshop on Procurement, Financial Management, and Monitoring & Evaluation*, conducted by HEQEP unit, University Grants Commission, Dhaka, Bangladesh (April 23-26, 2012).
- *Speeding Up MATLAB*, conducted by Mathworks, Washington, DC (2009).
- *Physics of Semiconductor Lasers*, conducted by Weng W. Chow, Sandia National Laboratories, IEEE Photonics Society Annual meeting (2008).
- *Quantum Cascade Lasers: From Band Structure Engineering to Commercialization*, conducted by Frederico Capasso, Harvard University, CLEO / QELS 2008, San Jose (2008).
- *Quantum Well Devices for Optics and Optoelectronics*, conducted by David A. B. Miller, Stanford University, CLEO / QELS 2008, San Jose (2008).
- *Advanced Programming in MATLAB*, conducted by Center for Interdisciplinary Research and Consulting, Department of Mathematics and Statistics, UMBC (2007).
- *Self-Contained Breathing Apparatus Training*, organized by UMBC (2007).
- *Mobile and Wireless Communication*, organized by Directorate of Continuing Education, BUET (2004).
- *Teacher's Appreciation Workshop*, organized by Directorate of Continuing Education, BUET (2001).
- *Telecom Platform and AXE Survey*, conducted by Ericsson Academy – Malaysia (2001).



- *GSM System Survey*, conducted by Ericsson Academy – Malaysia (2001).
- *CME 20 Advanced System Technique*, conducted by Ericsson Academy – Malaysia (2001).

## **SOFTWARE DEVELOPMENT**

1. QCL Simulation Package: Solves confined quantum energy levels and the associated electron wavefunctions of QCLs (available at <http://www.umbc.edu/photronics/software>).
2. Optical Mode Calculation: Solves optical mode shapes and confinement factors for QCLs.
3. QCL Carrier Transport: Calculates carrier distribution in the energy levels of QCLs.

## **REFERENCES**

1. Dr. Curtis R. Menyuk  
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