Dr. Muhammad Rakibul Islam

CONTACT INFORMATION

Assistant Professor, Department of Physics
Bangladesh University of Engineering & Technology,
Dhaka-1000, Bangladesh

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DATE OF BIRTH

01 January, 1981

NATIONALITY

Bangladeshi

EDUCATION

DOCTOR OF PHYLOSOPHY (Ph. D.) *May, 2015*
Department of Physics, University of Central Florida, Orlando, Florida, USA

Research Keywords: Nanofabrication, Carbon nanotube, 2D nano-materials, Electron transport properties, Single electron transistor.

Thesis: Parallel fabrication and transport properties of carbon nanotube single electron transistors

Supervisor: Professor Saiful I. Khondaker

MASTER OF SCIENCE (M. Sc.) in Physics *December, 2011*
Department of Physics, University of Central Florida, Orlando, Florida, USA

MASTER OF PHYLOSOPHY (M.Phil.) in Physics *June, 2009*
Department of Physics, Bangladesh University of Engineering & Technology (BUET)
Dhaka, Bangladesh

Research Keywords: Thin film, Transparent conducting oxide, solar cell.

Thesis: Structural, optical and electrical properties of ZnO and $Zn_{1-x}Cd_xO$ thin film deposited by spray pyrolysis technique

Supervisor: Professor Jiban Podder

MASTER OF SCIENCE (M. S.) in Physics *October, 2006*
Department of Physics, University of Dhaka, Dhaka, Bangladesh

Research Keywords: Theoretical High Energy Physics.

Thesis: Chiral symmetry in hot dense nuclear materials.

Supervisor: Professor Arshad Momen

BACHELOR OF SCIENCE (B.Sc.) in Physics *April, 2004*
Department of Physics, University of Dhaka, Dhaka, Bangladesh

Recent Research Grants

Title of the Project: *Synthesis and characterization of eco-friendly, biodegradeable plastic nano-composite using graphene Nano-filler for energy storage applications*
Amount: 4,00,000/- Taka
Funding Organization: Ministry of Science and Technology, Bangladesh.
Year: 2018-2019

Title of the Project: *Making plastic green: eco-friendly, biodegradable plastic nano-composite using plant-derived polymer with 2D graphene nano-filler*
Amount: 3,00,000/- Taka
Funding Organization: University Grant Commission, Bangladesh.
Year: 2018-2019

Title of the Project: *Synthesis and characterization of carbon nanotube-polymer nanocomposite for energy storage applications*
Amount: 14,00,000/- Taka
Funding Organization: Ministry of Education, Bangladesh.
Year: 2017-2020

Title of the Project: *Synthesis and Investigation of Transparent Conducting Oxide for optoelectronics applications by solgel dipcoating technique*
Amount: 5,40,000/- Taka
Funding Organization: CASR, BUET, Bangladesh.
Year: 2017

Title of the Project: *Synthesis and Investigation of Transparent Conducting Oxide for Solar Energy Applications*
Amount: 6,00,000/- Taka
Funding Organization: Ministry of Science and Technology, Bangladesh.
Year: 2016-2017

Students Supervised

Master of Science (M. Sc.) program	: One Student
B.Sc. in materials & Metallurgical Engineering Program	: Two Students

Students Under Supervision

Doctor of Philosophy (Ph.D.) program	: Two Students
Master of Philosophy (M.Phil.) program	: Two Students
Master of Science (M. Sc.) program	: Eight Students

Current Research Projects

1. Green synthesis of plastic using plant derived starch together with 1D and 2D nano-filler
2. Synthesis and characterization of inorganic nanoparticle for energy storage application
3. Structural, optical, and electrical properties of transparent conducting oxide thin film
4. Synthesis and Characterization of Graphene and carbon nanotube (CNT) based polymer nano-composite.

Professional Experience

ASSISTANT PROFESSOR November 2015-Present
Department of Physics, Bangladesh University of Engineering & Technology (BUET), Dhaka, Bangladesh

LECTURER November 2006- November 2015
Department of Physics, Bangladesh University of Engineering & Technology (BUET), Dhaka, Bangladesh

Graduate Teaching Assistant (GTA) January 2014 – May 2015
Department of Physics, University of Central Florida, Orlando, USA

Graduate Research Assistant (GRA) January 2010- December 2014
Department of Physics, University of Central Florida, Orlando, USA

LECTURER May 2006- November 2006
Presidency University, Dhaka, Bangladesh.

Patent

Plasma treated semiconductor dichalcogenide materials and devices therefrom, S Khondaker, **M. Islam**, L Tetard, US Patent 9,472,396

Publications

1. **Muhammad R. Islam,** Mukhlasur Rahman, S. F. U. Farhad, J. Podder, Structural, optical and photocatalysis properties of sol-gel deposited Al-doped ZnO thin films, Surface and interfaces,16, 120, 2019

2. M Zahan, **M R Islam** and J Podder, Influence of annealing temperature on tuning the band gap of Mn-doped ZnS thin films deposited by spray pyrolysis technique, Indian J Phys, 93, 611, 2019.

3. V C Saha, M M A Sabuj, P Shams, S Rahman, M R Qadir, **M. R. Islam** and F Gulshan, Synthesis and Characterization of Reduced Graphene Oxide Reinforced Polymer Matrix Composite, IOP Conf. Series: Materials Science and Engineering, 438, 012008, 2018

4. Nitin Choudhary, **Muhammad R. Islam**, Narae Kang, Laurene Tetard, Yeonwoong Jung, Saiful I Khondaker, J. Phys. Cond. Matr., 28, 364002, 2016. (Joint first author)

5. Saiful I. Khondaker, and **Muhammad R. Islam**, Bandgap Engineering of MoS_2 Flakes via Oxygen Plasma: A Layer Dependent Study, J. Phys. Chem. C, 120 , 13801, 2016

6. **Muhammad R. Islam**, and Saiful I. Khondaker, Towards parallel fabrication of SET via DEP assembly of individual single wall carbon nanotube, Nanoscale, 7, 9786, 2015.

7. **Muhammad R. Islam**, Narae Kang, Udai Bhanu, Hari P. Paudel, Mikhail Erementchouk, Laurene Tetard, Michael N. Leuenberger, and Saiful I. Khondaker, Electrical property tuning via defect engineering of single layer MoS_2 by oxygen plasma, Nanoscale, 6, 10033, 2014.

8. **Muhammad R. Islam**, and Saiful I. Khondaker, Recent progress in parallel fabrication of individual single walled carbon nanotube based devices using dielectrophoresis, Materials Express, 4, 263, 2014 (Invited Review Article).

9. Udai Bhanu, **Muhammad R. Islam**, Laurene Tetard, Saiful I Khondaker, Photoluminescence quenching in gold-MoS_2 hybrid nanoflakes, Nature Scientific Reports, 4, 5575, 2014.

10. Paul Stokes, **Muhammad R. Islam**, and Saiful I. Khondaker, Low temperature electron transport spectroscopy of mechanically templated carbon nanotube single electron transistors, J. Appl. Phys. 114, 084311, 2013.

11. **Muhammad R. Islam**, Kristy Kormondy,Eliot Silbar and Saiful I. Khondaker, A general approach for high yield fabrication of CMOS compatible all semiconducting carbon nanotube field effect transistors, Nanotechnology 23, 125201, 2012.

12. J. Podder, and **M. R. Islam**, Deposition of Nano Fiber ZnO and $Zn_{1-x}Cd_xO$ Thin Films by a Simple Spray Pyrolysis and Characterizations for Optoelectronic Applications, Advanced Materials Research, 545, 100, 2012.

13. **Muhammad R. Islam**, Daeha Joung, and Saiful I. Khondaker, Schottky diode via dielectrophoretic assembly of reduced graphene oxide sheets between dissimilar metal contacts, New J. Phys. 13, 035021, 2011.

14. Biddut K. Sarker, **Muhammad R. Islam**, Feras Alzubi, and Saiful I. Khondaker, Fabrication of Aligned Carbon Nanotube Array Electrodes for Organic Electronics Devices, Materials Express 1, 80, 2011.

15. **M. R. Islam**, J. Podder, S.F.U. Farhad and D. K. Saha, Annealing effects on the structural and optical properties of nanocrystalline ZnO films deposited by spray pyrolysis, Sensors & Transducers, 134, 170, 2011.

16. M. M. Islam, J. Podder and **M. R. Islam**, Effect of molar concentration on the optical and surface properties of CdO thin films deposited by spray pyrolysis, Optoelectronics and Advanced Materials-Rapid Communications, 4, 968, 2010.

17. **M. R. Islam** and J Podder, Optical properties of ZnO nano fiber thin films grown by spray pyrolysis of zinc acetate precursor, Cryst. Res. Technol., 44, 286, 2009.

18. M.M.Islam, **M. R. Islam** and J. Podder, Optical and electrical properties of CdO thin films deposited by spray pyrolysis method, J. Bangladesh Academy of Sciences, 32, 97, 2008.

Selected Conference Presentations

1. Shafiqul Islam Mahfuz, Muhammad R. Islam, Highly-enhanced optical, mechanical and dielectric performance of Graphene oxide (GO) enriched enriched starch nanocomposite, N*ational Conference on Physics*, Dhaka, Bangladesh, February 7-9, 2019

2. S.M. Nazmus Shakib Pias, K. M. Abu Hurayra – Lizu, Muhammad R. Islam, Solution Processed Single Wall Carbon Nanotube- PVA nanocomposite: optical, thermal, electrical, and mechanical investigation, N*ational Conference on Physics*, Dhaka, Bangladesh, February 7-9, 2019

3. Jaed Ebna Obaid, Md. Saiduzzaman, Alamgir Kabir, Muhammad R. Islam, Structural, electrical and optical properties of CuO and Al-doped CuO nanoparticle synthesized by solution combustion technique, N*ational Conference on Physics*, Dhaka, Bangladesh, February 7-9, 2019

4. K. M. Abu Hurayra – Lizu, S. M. Nazmus Shakib Pias, Fahmida Gulshan, Muhammad R. Islam,GO based PVA nanocomposites: Tailoring of optical and structural properties of PVA with low percentage of GO nanofillers, N*ational Conference on Physics*, Dhaka, Bangladesh, February 7-9, 2019

5. Mukhlasur Rahman, S. F. U. Farhad , J. Podder , Muhammad R. Islam, Effect of aluminum (al) doping on the photocatalytical properties of nanostructured zinc oxide (azo) thin films, *International Conference on Material Science and Semiconductor Devices*, September 7-8, 2018, University of Dhaka, Bangladesh.

6. Shafiqul Islam Mahfuz, Muhammad R. Islam, Synthesis of graphene oxide and characterization of plasticized starch based go polymer nanocomposites, *International Conference on Material Science and Semiconductor Devices,* September 7-8, 2018, University of Dhaka, Bangladesh.

7. Md. Saiduzzaman, Jaed Ebna Obaid, Alamgir Kabir, and Muhammad R. Islam, Synthesis and Characterization of Copper Oxide Nanoparticle by Modified Sol Gel Techniques, Interational Conference on Physics, Dhaka, Bangladesh, March 8-10, 2018

8. Shafiqul Islam Mahfuz and Muhammad R Islam, Synthesis and Characterization of Biodegradable Starch Based GO and RGO Polymer, Interational Conference on Physics, Dhaka, Bangladesh, March 8-10, 2018

9. Mohammad Golam Azam, Mukhlasur Rahman. M. N. I. Khan, and Muhammad R. Islam, Effect of Cu concentration on the sol-gel deposited Zinc Oxide thin films, International Conference on Physics, Dhaka, Bangladesh, March 8-10, 2018

10. Mukhlasur Rahman, S.F. U. Farhad, J. Podder, and Muhammad R. Islam, Sructural, Optical, Electrical and Uv-Assisted Photocatalytical Properties of Nanostructured Aluminum Doped Zinc Oxide (Azo) Thin Films, Interational Conference on Physics, Dhaka, Bangladesh, March 8-10, 2018

11. The Morphological and Optical Properties of Graphene Oxide-Tin Oxide Nanocomposite: M. B. Azim, I. A. Tanim, M. R. Islam, A.S.W Kurny and F. Gulshan, National Conference on Physics, Dhaka, Bangladesh, January 5-7, 2017.

12. Muhammad R. Islam, Narae Kang, Udai Bhanu, Hari P. Paudel, Mikhail Erementchouk, Laurene Tetard, Michael N. Leuenberger, and Saiful I. Khondaker, Electrical property tuning via defect engineering of single layer MoS2 by oxygen plasma, Annual Joint Symposium & Exhibition: Florida Chapter of the AVS Science and Technology Society (FLAVS), Florida Society for Microscopy (FSM) University of Central Florida, Orlando, USA, March 9-10 2015.

13. Muhammad R. Islam, Daeha Joung, and Saiful I. Khondaker, Towards parallel, CMOS-compatible fabrication of carbon nanotube single electron transistors, APS March Meeting, Denver, Colorado, USA, March 3-7, 2014.

14. Udai Bhanu, Muhammad R. Islam, Laurene Tetard, Saiful I Khondaker, Carbon nanotube- MoS_2 p-n junction: Fabrication and transport properties, APS March Meeting, Denver, Colorado, USA, March 3-7, 2014.
15. Muhammad R Islam, Daeha Joung, Saiful I Khondaker, Design rule for the fabrication of carbon nanotube single electron transistor, Graduate Research Forum, University of Central Florida, Orlando, USA, April-2, 2013.

16. Muhammad R Islam, Daeha Joung, Saiful I Khondaker, Design rule for the fabrication of carbon nanotube single electron transistor, Annual Joint Symposium & Exhibition: Florida Chapter of the AVS Science and Technology Society (FLAVS), Florida Society for Microscopy (FSM), University of Central Florida, Orlando, USA, March 4-5, 2013.

17. Muhammad R. Islam, Kristy Kormondy,Eliot Silbar and Saiful I. Khondaker, A general approach for high yield fabrication of CMOS compatible all semiconducting carbon nanotube field effect transistors, APS March Meeting, Boston, Massachusetts, USA, February 27-March 2, 2012.

18. Muhammad R. Islam, Kristy Kormondy,Eliot Silbar and Saiful I. Khondaker, A general approach for high yield fabrication of CMOS compatible all semiconducting carbon nanotube field effect transistors, Annual Joint Symposium & Exhibition: Florida Chapter of the AVS Science and Technology Society (FLAVS), Florida Society for Microscopy (FSM), University of Central Florida, Orlando, USA, March 5-6, 2012.

19. Muhammad R. Islam, Daeha Joung, and Saiful I. Khondaker, Schottky diode via dielectrophoretic assembly of reduced graphene oxide sheets between dissimilar metal contacts, Annual Joint Symposium & Exhibition: Florida Chapter of the AVS Science and Technology Society (FLAVS), Florida Society for Microscopy (FSM), University of Central Florida, Orlando, USA, March 7-8, 2011.

20. Muhammad R. Islam, Daeha Joung, and Saiful I. Khondaker, Schottky diode via dielectrophoretic assembly of reduced graphene oxide sheets between dissimilar metal contacts, APS March Meeting, Dallas, Texas, USA, March 21-25, 2011.

21. Muhammad R. Islam, Shashank Shekharand Saiful I. Khondaker, Luttinger-liquid

behavior in aligned array of single wall carbon nanotube, NanoFlorida™ 2010, University of Central Florida, Orlando, USA , September-2010.

22. Muhammad Islam, M. Arif, Lei Zhai, S. I. Khondaker, Temperature dependent charge transport in regioregular poly (3-hexylthiophene) crystalline nanoribbon field effect transistor, Graduate Research Forum, University of Central Florida, Orlando, USA, April-2, 2010.

23. Muhammad Islam, M. Arif, Lei Zhai, S. I. Khondaker, Temperature dependent charge transport in regioregular poly (3-hexylthiophene) crystalline nanoribbon field effect transistor, APS March Meeting, Portland, Oregon, March 15-19, 2010.

24. M. R. Islam and J. Podder "Investigations on the structural and optical properties of ZnO nano fiber thin films deposited by spray pyrolysis method", International Conference on Frontiers of Physics, organized by Nepal Physical Society & Tribhuvan University, Abstract Book-Paper no. 42, Page-27, June 2-5, 2009, Kathmandu, Nepal.

25. M. R. Islam, J. Podder, S.F.U.Farhad, M.R.I. Chowdhury and D.K.Saha "The structural and optical properties of nanocrystalline ZnO films deposited by spray pyrolysis", International Physics Conference, organized by Bangladesh Physical Society, Abstract Book-Paper no. V-CP 22, May 15-17, 2009, Dhaka, Bangladesh.
26. M. M. Islam, M. R. Islam, and J. Podder,Optical and electrical characteristics of CdO thin films deposited by spray pyrolysis method, Bose Conference on Contemporary Physics-08, organized by ICTP & Dhaka University, March 19-21, 2008, Dhaka, Bangladesh.
27. M. M. Islam, M. R. Islam, and J. Podder, "Synthesis of CdO thin film of different molar concentration by spray pyrolysis method", National conference cum workshop on material science and technology, December 2-4, 2007, BUET, Dhaka, Bangladesh.

28. M. R. Islam and M. A. Momen, Chiral Symmetry in Hot Dense Nuclear Matter.Annual Conference on Physics Education and Employment,19 - 20 April 2007, Dhaka, Bangladesh, Organized By BPS.

TECHNICAL SKILLS

- **Nano-fabrication**: Comprehensive experience in nanofabrication (~20 nm) of carbon nanotube, graphene and molybdenum disulphide based devices using **photolithography and electron-beam lithography**
- **Nano-composite synthesis:** Synthesis of polymer nano-composite using carbon nanotube, graphene as filler materials
- **Clean room experience**: Trained in working in clean room (Class 1000) environment
- **Thin film**: Electron beam evaporation, thermal evaporation, spray pyrolysis deposition.
- **Imaging**: Atomic force microscopy (AFM), Scanning electron microscopy (SEM).
- **Structural Characterization**: X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), and Raman Spectroscopy.
- **Electrical Characterization**: Electron transport measurement of nano-electronic devices fabricated using carbon nanotube, graphene, molybdenum disulphide, and

solution processed organics.

- **Low temperature measurement**: In depth experience low temperature device characterization in ^4He (desert cryogenics) and cryostats.
- **Device Physics**: Strong background in semiconductor device physics.
- **Software**: *Proficient* at Designcad, Microsoft Word, Excel; PowerPoint, Origin, and SIMON 2.0 (single electron device simulator). Experience in C++, Mathematica, LabView.
- Skilled in laboratory setup, operating laboratory electronics such as oscilloscopes, function generators, power supplies, lock-in amplifiers and interfacing them with computer via Labview.

RESEARCH EXPERIENCES

Graduate Research Assistant Jan 2010 – May-2015

NanoScience Technolgy Center, University of Central Florida, Orlando, Florida, USA

- Leading the design and optimization of large scale fabrication of single wall carbon nanotube field effect transistor (FET).
- Design and fabrication of CMOS compatible parallel fabrication 1D quantum dot and single electron transistor (SET) using single wall carbon nanotube and study their transport measurement.
- Design and study electronic property evolution of molybdenum disulphide (MoS_2) based nanodevices.
- Design and fabrication of graphene based nano-devices for switching operation.
- Fabrication of solar cell using p3HT: PCBM polymer blend and analyze the efficiency of the solar cell using solar simulator.

M. Phil Research Oct 2006 – Jun 2009

Bangladesh University of Engineering & Technology, Dhaka, Bangladesh

- Designed and built thin film deposition unit using spray pyrolysis deposition (SPD) technique
- Fabrication and electrical, optical characterization of transparent conducting oxide thin film made by spray pyrolysis deposition (SPD).

TEACHING SKILLS

Assistant Professor Nov 2015 - Present

Department of Physics, Bangladesh University of Engineering & Technology, Dhaka Bangladesh

- Instructed postgraduate physics theory courses (Quantum Mechanics, Nanophysics).
- Instructed undergraduate physics theory courses to the engineering students.
- Instructed experiments in undergraduate Physics lab.
- Supervising students for their M.Sc., M.Phil. and PhD thesis

Graduate Teaching Assistant (GTA) Aug 2009 - Dec 2009

Department of Physics, University of Central Florida, Florida, USA.

- Instructed undergraduate physics lab classes.
- Assisted faculties in their teaching responsibilities.
- Proctored examinations, graded the quizzes, and lab reports.

Lecturer Nov 2006 – Nov 2015

Department of Physics, Bangladesh University of Engineering & Technology, Dhaka Bangladesh

- Instructed undergraduate physics theory courses to the engineering students.

- Instructed experiments in undergraduate Physics lab.

Honors/ Awards

- Graduate Travel Fellowship Award, University of Central Florida, Orlando, USA, (2010, 2011, 2012, 2014).
- Graduate Student Association (GSA) Travel Expense Award, University of Central Florida, USA, (2010, 2011, 2012, 2014).
- Best Poster Award in NanoPhotonics and Nanoelectronics category at NanoFlorida, USA (2010).
- Honorable Mention for poster presentation at Florida Chapter of Vacuum Society, USA (2010).
- Best Student Award for Academic Excellence, University of Dhaka (2003).

Training and Workshop

- **University of Florida, Florida, USA, April-2013**
  Workshop on nanofabrication and characterization
- **Bangladesh University of Engineering & Technology, Dhaka, Bangladesh, December-2006**
  Teachers appreciation workshop

Professional Development and Outreach

- Served as President at the Bangladesh student association at UCF, 2012-2013.
- Member, Graduate Society of Physics Students (GSPS)
- Member, American Physical Society (APS)
- Life member, Bangladesh Physical Society (BPS)

References

1. **Dr. Saiful I. Khondaker.**
   Professor.
   Department of Physics & NanoScience Technology Center.
   University of Central Florida.
   12424 Research Parkway
   Orlando, Fl-32826, USA.
   email: saiful@ucf.edu
   Phone: 1-407-864-5054.

2. **Dr. Md. Abu Hashan Bhuiyan**
   Professor.
   Department of Physics
   Bangladesh University of Engineering and Technology (BUET)
   Dhaka-1000, Bangladesh
   email: abhuiyan@phy.buet.ac.bd
   Phone: 880-1712836384

3. **Dr. Jiban Podder**
   Professor
   Department of Physics
   Bangladesh University of Engineering and Technology (BUET)

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Phone: 880-1552423766