

ABU KOWSAR

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EXPERTISE/RESEARCH AREAS

My research expertise/interests lie in the following specific areas:

- ✦ Photovoltaic Cell: High efficiency multijunction solar cell, Thin-film solar cell (CZTS, CdTe, DSSC), and Perovskite solar cell.
- ✦ Low cost and Environment friendly materials synthesis and their property optimization for thin-film photovoltaic devices.
- ✦ Renewable Energy Applications: Solar Power Plant, Solar cell simulator, Solar Electric Cooker, Green Refrigerator.

EDUCATIONAL BACKGROUND

M.S: Department of Applied Physics, Electronics & Communication Engineering, University Of Dhaka, Passing Year: 2010, Degree Awarded: November, 2012

B.S: Department of Applied Physics, Electronics & Communication Engineering, University Of Dhaka, Passing Year: 2009, Degree Awarded: May, 2011.

JOB AND RESEARCH EXPERIENCES

July 2015 – present **Scientific Officer**
Bangladesh Council of Scientific & Industrial Research, BCSIR
Dhaka, Bangladesh

April 2014 -July 2015 **Post Graduate Fellow,**
Institute Fuel Research and Development (IFRD),
Bangladesh Council of Scientific and Industrial Research (BCSIR).

ON-GOING R&D PROJECTS

- 1. Project Title:** Development of a novel modeling and simulation tool for solar cells.
Role: Project Leader
Tenure: 2019-2022

- 2. Project Title:** Construction of low-cost electrical equipment for developing Standard Test Methods for Measuring Electrical Conductivity of Solid, Semi-solid, and liquid materials
Role: Associate (with Dr. Syed Farid Uddin Farhad, Project Leader BCSIR Labs. Dhaka)
Tenure: 2017-20
- 3. Project Title:** Low cost and Environment-friendly semiconducting materials synthesis and property optimization for solar cell applications
Role: Associate (with Dr. Syed Farid Uddin Farhad, Project Leader BCSIR Labs. Dhaka)
Tenure: 2017-20

COMPLETED R&D PROJECTS

- 4. Project Title:** Design and development of a low cost Green Refrigerator and Solar Hybrid Electric Cooker
Role: Project Leader (PL)
Tenure: 2017-18
- 5. Project Title:** Development of a high efficiency multijunction solar cell simulator for cost effective solar panel fabrication, Special Allocation from Ministry of Science and Technology.
Role: Principal Investigator
Tenure: 2017-18
- 6. Project Title:** Development of a high efficiency one dimensional multijunction solar cell simulator (MSCS-1d) for cost effective solar panel fabrication: Version-2 (MSCS-1d: V-2)
Role: Principal Investigator
Tenure: 2018-19

PUBLICATION HIGHLIGHTS:

1. **Abu Kowsar**, Mashudur Rahaman, Abdullah Yousuf Imam, Md. Saidul Islam, Sumon Chandra Debnath, Munira Sultana, Afrina Sharmin, Zahid Hasan Mahmood, Syed FaridUddin Farhad, "Progress in Major Thin-film Solar Cells: Growth Technologies, Layer Materials and Efficiencies", Journal of Renewable Energy Research, Vol. 9(2), Pp 579-598, 2019. (**Scopus Indexed, Impact factor: 3.12**)
2. **Abu Kowsar**, Syed Nazmus Sakib, Masum Billah, Sujoy Dey, Khaledun Nahar Babi, Ali Newaz Bahar, Syed Farid Uddin Farhad., "A novel simulator of multijunction solar cells: MSCS-1D" Submitted to the Journal of Computational Electronics, **Springer**, Submission ID: JCEL-D-19-00280, May 2019. (**SCIE Indexed, Impact factor: 1.69**)
3. M. Hossain, N. I. Tanvir, M. S. Bashar, **A. Kowsar**, S. Islam, and S. F. U. Farhad, "Synthesis and Characterization of Oriented Phase Pure Cu₂O Thin Films Grown By A Simple Potentiostatic Electrodeposition Technique", National Conference on Physics, 7-9 February, Dhaka, 2019.

4. **Abu Kowsar** and Syed FaridUddin Farhad, “*High Efficiency Four Junction III-V Bismide Concentrator Solar Cell: Design, Theory, and Simulation*” International Journal of Renewable Energy Research; Vol. 8 Issue 3. Pp 1762-1769, **2018 (Scopus Indexed, Impact factor: 3.12)**
5. **Abu Kowsar**, Syed Farid Uddin Farhad, Nasifa Akter, Kawsar Ahmed, Mst. Sarmina Yesmin, Md. Abdul Jalil, Hosney Ara Begum, Md. Moin Uddinand Most. Hamida Khatun, "Design, construction and performance studies of a non-electric refrigerator using eco-friendly refrigerant materials," Journal of Fundamentals of Renewable Energy and Applications, 8(4):1000264, **2018, DOI: 10.4172/2090-4541.1000264**
6. **Abu Kowsar**, Syed Farid Uddin Farhad, and Syed Nazmus Sakib, “*Effect of the Bandgap, Sun Concentration and Surface Recombination Velocity on the Performance of a III-V Bismide Multijunction Solar Cells*”, International Journal of Renewable Energy Research, Vol. 8 Issue 4. Pp 2218-2227, 2018. (**Scopus Indexed, Impact factor: 3.12**)
7. Billal Hosen, Md. Karamot Ali, Ali Newaz Bahar, Md. Asaduzzaman, **Abu Kowsar**, Kawasr Ahmed,” "Modeling and performance optimization of ZnS/CIGS chalcopyrite solar cell with over 25% efficiency enabled by using a CuIn₃Se₅ OVC", Submitted to the Journal of Modern Power Systems and Clear Energy (MPCE), (**Springer**) Submission ID: MPCE-D-18-00436; **2018**.
8. Sabbir Akhanda, Rummana Matin, Muhammad Shahriar Bashar, Munira Sultana, **Abu Kowsar**, Mashudur Rahaman and Zahid Hasan Mahmood,“Effect of annealing atmosphere on structural and optical properties of CZTS thin films prepared by spin-coating”, *Bangladesh Journal of Scientific and Industrial Research (BJSIR)*, 53(1):13, **2018**; DOI: <http://dx.doi.org/10.3329/bjsir.v53i1.35905>
9. Sabbir Akhanda, Rummana Matin, Muhammad Shahriar Bashar, **Abu Kowsar**, Mashudur Rahaman and Zahid Hasan Mahmood,“Experimental Study on Structural, Optical and Electrical Properties of Chemical Bath Deposited CdZnS Thin Films”, *Journal of Fundamentals of Renewable Energy and Applications*, Vol 7(1), 2017, USA. DOI: 10.4172/2090-4541.1000222
10. Shamima Khanom, Md. Kamal Hossain, Farid Ahmed, Md. Abul Hossain, **Abu Kowsar**, Mashudur Rahaman: *Simulation study of multijunction solar cell incorporating GaAsBi*. 2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC); (Scopus), 2017, DOI: 10.1109/R10-HTC.2017.8288992
11. **Abu Kowsar**, Md Abul Hossion, Md Sofikul Islam, Afrina Sharmin and Zahid Hasan Mahmood,” Analysis of theoretical efficiencies of GaInP₂/GaAs/Ge multijunction solar cell,” *The Dhaka University Journal of Applied Science and Engineering*, 3, No.1 January, **2015**.
12. **Abu Kowsar**, Abdullah Yousuf Imam, Mashudur Rahaman, Muhammad Shahriar Bashar, Md. Saidul Islam, Sumona Islam, Nowrin Akter Surovi and Zahid Hasan Mahmood, “Comparative study on the efficiencies of silicon solar cell”, *IOSR Journal of Applied Physics (IOSR-JAP)*, ISSN: 2278-4861. Volume 6, Issue 6 Ver. IV, PP 13-17, 2014.
13. Syed Nazmus Sakib, Syeda Puspita Mouri, **Abu Kowsar**, Mashudur Rahaman, Shamim Kaiser, “Theoretical Efficiency of AlAs/GaAs/GaAs_{0.91}Bi_{0.085} Based New Multijunction Solar Cell and Effects of Solar Radiation and Sun Concentration on it”, *International Conference: MicroCom* , Volume: 1, (**Scopus**), **2016, India**. DOI: 10.1109/MicroCom.2016.7522591

14. Syed Nazmus Sakib, Syeda Puspita Mouri, **Abu Kowsar**, Mashudur Rahaman, Shamim Kaiser, “Theoretical Efficiency of AlAs/GaAs/GaAs_{0.91}Bi_{0.085} Based New Multijunction Solar Cell and Effects of Solar Radiation and Sun Concentration on it”, *International Conference: MicroCom*, Volume: 1, (Scopus), 2016, India. DOI: 10.1109/MicroCom.2016.7522591
15. **Abu Kowsar**, Sofikul Islam, Kazi Rizwana Mehzabeen and, Zahid Hasan Mahmood,” Solar Energy to Meet the Energy Crisis in Bangladesh”, 10th *International Conference on Environmental Aspects of Bangladesh*, Pp 113-115, 2010, **Japan**
16. **Abu Kowsar**, Sofikul Islam, Kazi Rizwana Mehzabeen and, Zahid Hasan Mahmood,” Study on the Efficiency of the GaInP₂/GaAs/Ge Multijunction Solar Cell,” *Proc. Of 10th International Conference on Environmental Aspects of Bangladesh*, Pp 116-119, September 4-8, 2010, **Japan**.
17. **Abu Kowsar**, Kazi Rizwana Mehzabeen, Md. Sofikul Islam and Zahid Hasan Mahmood,” Determination of the theoretical efficiency of GaInP₂/GaAs/GaAs_{1-x}Bi_x multijunction solar cell,” 10th *International conference on fiber optics and Photonics Photonics (Photonics-2010)*, 317_GP_Kowsar_Abu_01
18. Md Abul Hossion, **Abu Kowsar**, Chandan Kumar Howlader, Zahid Hasan Mahmood, “Performance analysis of super high efficiency three junction series connected tandem solar cell”, 10th *International Conference on Fiber Optics & Photonics, (PHOTONICS 2010: 402)_TMS_Hossain_Abul_2010*.
19. **Abu Kowsar**, Syed Farid Uddin Farhad, Hosney Ara Begum, Nazmul Islam Tanvir, Mohammad Sajjad Hossain, Most Hamida Khatun, “Development of Energy Efficient Home Appliances to reduce the Electricity demand on National Grid”, *Proceedings of 2nd International Conference on Sustain development*, 15-17 February, 2018, **Bangladesh**.
20. **Abu Kowsar**, Abul Hossion and Zahid Hasan Mahmood,” Performance analysis of super high efficiency GaInP₂/GaAs tandem solar cell”, *of International Conference of Magnetism and Advance Material (ICMAM-2010)*, Pp 83-84, BUET, 2010, **Bangladesh**.

PATENT & COPYRIGHT:

1. **Abu Kowsar**, Nasifa Akter, Most. Hamida Khatun, Md. Abdul Jalil, Md. Moinuddin, Dr. Mst. Sarmina Yeasmin: “Design and Development of a Low Cost Electric Powerless Novel Green Refrigerator”, (BCSIR Ref. No. 39.02.8140.038.37.048.17/1144; date 14.06.2018), **WIPO Bangladesh Chapter** (Department of Patents, Designs and Trademarks (DPDT), Ministry of Industries, Bangladesh), Bangladesh Patent Serial No: 1006123, Accept date: 01.07.2019.
2. Syed Farid Uddin Farhad, **Abu Kowsar**, Nazmul Islam Tanvir, Dr. Most. Hosney Ara Begum, “Development of a low-cost portable rechargeable spin coater for thin film solar cell deposition”, (BCSIR Ref..No. 39.02.0000.043.37.147.18/751; date 14.06.2018), Submitted to **WIPO**, Department of Patents, Designs and Trademarks (DPDT) Ministry of Industries, Bangladesh, 2018.
3. **Abu Kowsar**, “Design development of a Large Scale Solar Power Plant in Wetland”, Submitted to **WIPO**, Bangladesh Copyright Office (**WIPO**, Bangladesh Chapter), Reg. No. L-2018479-00888, Date: 02.12.2018.

4. **Abu Kowsar**, “Development of a theoretical model for performance evaluation of III-V multijunction solar cell”, Bangladesh Copyright Office (*WIPO, Bangladesh Chapter*), Reg. No. L 16687, Date: 08.01. 2019.
5. **Abu Kowsar**, “Development of an one dimensional multijunction solar cell simulator: version-1 (MSCS-1D: V-1)” Bangladesh Copyright Office (*WIPO, Bangladesh Chapter*), Reg. No. L 16686, Date: 08.01. 2019.

PROCESS:

1. Syed Farid Uddin Farhad, **Abu Kowsar**, Nazmul Islam Tanvir, Dr. Most. Hosney Ara Begum, “Production of a low-cost portable rechargeable spin coater for thin-film solar cell fabrication”, BCSIR Ref..No. 39.02.0000.043.37.195.18; date 24.04.2019.

PARTICIPATION IN TRAINING

1. Attended a basic training program on Photoluminescence, at BCSIR Central Laboratory, Bangladesh held during 06 – 08 March, 2018.
2. Attended a training course on operating system and maintenance of Wavelength Dispersive X-ray Fluorescence (WDXRF) IMMM, BCSIR, Bangladesh held during 14 – 16 March, 2017.
3. Attended a training course on Project appraisal, EIA and formulation of DPP at National Academy of Planning and Development (NAPD), Bangladesh held during 16 July –04 August, 2017.
4. Attended a training course on solar photovoltaic (PV) energy technology at Institute of Fuel Research and Development (IFRD), BCSIR, Bangladesh held during 13 – 16 Sept., 2015.

GRANTS

1. Development of a high efficiency one dimensional multijunction solar cell simulator (MSCS-1d) for cost effective solar panel fabrication: Version-2 (MSCS-1d: V-2), Special Allocation from Ministry of Science and Technology, Government of Bangladesh for 2018-19 fiscal year. (Ref. No. 39.00.0000.09.02.90.18-19/09/458/ID-57 Date: 14.01.2019).
2. Development of a high efficiency multijunction solar cell simulator for cost effective solar panel fabrication, Special Allocation from Ministry of Science and Technology, Government of Bangladesh for 2017-18 fiscal year. (Ref. No. 39.00.0000.09.06.79.2017/2; Date: 06.11.2017).

AWARD:

1. Best Poster Award from the National Conference on Physics-19. February 2019
2. Third prize from Inter University Innovation Competition, Ministry of Power and Energy, Government of Bangladesh, October 2016.