MAHMUDUL HASAN DOHA

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RESEARCH INTEREST

Layered two-dimensional (2D) materials have triggered enormous interest since their emergence. 2D materials having puckered hexagonal honeycomb structure are intrinsically anisotropic. In the hexagonal honeycomb structure, there are two different atomic configurations along the two different directions- zigzag and armchair. A flat honeycomb structure is anisotropic only at edges. In puckered hexagonal honeycomb structure, because of these different atomic configurations, these materials demonstrate anisotropy in electrical, optical and thermal conductivity. Because of these anisotropic properties, these layered 2D materials are promising candidates for modern electronic and optoelectronic devices. My focus is on the experimental investigation of the properties of anisotropic 2D materials.

SKILLS

Programming
Python • Java • C • C++ • R • Matlab • Mathematica • LaTeX• PHP • HTML • CSS • JavaScript • Git.

Database Management
MySQL • MariaDB • PostgreSQL • MongoDB • SQLite.

Simulation
COMSOL Multiphysics • Lumerical.

Instruments Automation
Labber • LabVIEW • QCoDeS.

Graphing
IgorPro • OriginPro.

Drawing
Photoshop • Illustrator • AutoCAD • Onshape • Blender.

Research Skills
Molecular Beam Epitaxy (MBE) • Photoluminecence (PL) • Raman Spectroscopy • Reflection Antisotropy Spectroscopy (RAS) • Photoluminecence Excitation (PLE) • Atomic Force Microscopy (AFM) • Mechanical Exfoliation • Electron Beam Lithography (EBL) • Evaporator • Reflection High Energy Electron Diffraction (RHEED) • X-ray Diffraction (XRD) • Hall Measurement • Cathodoluminescence..

RESEARCH AND PROFESSIONAL EXPERIENCE

Graduate Research Assistant – Churchill Lab — Nov. 2016 – *Current*
University of Arkansas, Fayetteville, AR
- Supervisor: Hugh O. H. Churchill, Ph. D.

Graduate Teaching Assistant – Department of Physics — Aug. 2016 – *Current*
University of Arkansas, Fayetteville, AR

Lecturer – Department of Electrical & Electronics Engineering — Jun. 2015 – Jul. 2016
Ranada Prasad Shaha University, Narayanganj, Bangladesh

Software Engineer – Tappware Solutions — Dec. 2014 – May. 2015
Dhaka, Bangladesh

Software Engineer – Habib Intelligent Software Limited — Oct. 2014 – Nov. 2014

Dhaka, Bangladesh

Trainee – FTFL Track Specific Training (1st Batch) Jul. 2014 – Sept. 2014

- Track: PHP & LARAVEL framework
- Institute: BASIS Institute of Technology & Management Dhaka, Bangladesh

Trainee – FTFL Foundation Training (1st Batch) May 2014 – Jun. 2014

- Institute: Bangladesh Academy for Rural Development (BARD) Comilla, Bangladesh

TEACHING EXPERIENCE

Graduate Teaching Assistant – Department of Physics Aug. 2016 – *Current*
University of Arkansas, Fayetteville, AR

- University Physics I & II
- College Physics I & II
- Physics for Human Affairs

Lecturer – Department of Electrical & Electronics Engineering Jun. 2015 – Jul. 2016
Ranada Prasad Shaha University, Narayanganj, Bangladesh

- University Physics I
- Electricity & Magnetism
- Electric Circuits

EDUCATION

Ph.D. candidate – Physics Aug. 2016 – May 2021 (Expected)
Department of Physics, University of Arkansas, Fayetteville, AR

- Thesis: Two Dimensional Materials with In-plain Anisotropy
- Advisor: Hugh O. H. Churchill, Ph. D.

Master of Science (M. S.) – Physics 2010 – 2011 (Exam Held in 2012)
Department of Physics, University of Dhaka, Dhaka, Bangladesh

- Thesis: Growth and Characterization of Chemically Deposited Zinc Sulfide (ZnS) Thin Films for Solar Cell Applications.
- Advisor: A. B. M. Obaidul Islam, Ph. D.

Bachelor of Science (B. S.) – Physics 2006 – 2010 (Exam Held in 2011)
Department of Physics, University of Dhaka, Dhaka, Bangladesh

COURSEWORK

Graduate
Mathematical Methods for Physics • Quantum Mechanics I & II • Advanced Electromagnetic Theory I & II • Condensed Matter Physics I, II & III • Statistical Mechanics • Optical Properties of Materials • Advanced Mechanics • Two Dimensional Materials • Non Equilibrium Statistical Mechanics • Advanced Laser Physics.

Undergraduate
Electricity and Magnetism • Mechanics • Thermal Physics • Waves and Optics • Electronics • Mathematical Physics • Atomic and Molecular Physics • Classical Mechanics and Special Theory of Relativity • Classical Electrodynamics • Quantum Mechanics I & II • Nuclear Physics • Solid State Physics I & II • Programming and Scientific Computing • Electronics and Computer • Statistical Mechanics • Methods of Experimental Physics.

JOURNAL PAPERS

[J.3] Josh P. Thompson, **M. Hasan Doha**, Peter Murphy, Jin Hu, and Hugh O. H. Churchill. "Exfoliation and Analysis of Large-area, Air-Sensitive Two-Dimensional Materials". In: *JoVE (Journal of Visualized Experiments)* 143 (Jan. 2019), e58693. ISSN: 1940-087X. DOI: 10.3791/58693.

[J.2] M. H. Rashid, J. Rabeya, **M. H. Doha**, O. Islam, P. Reith, G. Hopman, and H. Hilgenkamp. "Characterization of single step electrodeposited Cu2ZnSnS4 thin films". en. In: *Journal of Optics* 47.3 (Sept. 2018), pp. 256–262. ISSN: 0974-6900. DOI: 10.1007/s12596-018-0463-0.

[J.1] **M. H. Doha**, M. J. Alam, J. Rabeya, K. A. M. H. Siddiquee, S. Hussain, O. Islam, M. A. Gafur, S. Islam, N. Khatun, and S. H. Sarkar. "Characterization of chemically deposited ZnS thin films on bare and conducting glass". In: *Optik* 126.24 (Dec. 2015), pp. 5194–5199. ISSN: 0030-4026. DOI: 10.1016/j.ijleo.2015.09.234.

WORK IN PROGRESS

[M.1] D. T. Debu, **M. Hasan Doha**, Hugh O. H. Churchill, and Joseph P. Herzog. "Gate Voltage and Doping Effects on Near-Field Radiation Heat Transfer in Plasmonic Heterostructures of Graphene and Black Phosphorene," In preparation.