Curriculum Vitae
Md Toukir Hasan

Contact information

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Education

PhD in Mechanical Engineering   Aug 2021-Present
Purdue University

Master of Science in Mechanical Engineering   Jan 2020-Aug 2021
University of Texas Rio Grande Valley   GPA: 3.90/4.0

Bachelor of Science in Mechanical Engineering   July 2014-Oct 2018
Bangladesh University of Engineering and Technology   GPA: 3.66/4.0

Awards and Achievements

- Dean's list Award- Academic year 2017-2018, BUET, Bangladesh
- Education Board Technical scholarship 2014 to 2018, for securing 95% marks in 12th standard exam
- Awardee in National chemistry Olympiad 2012, Bangladesh
- Ranked 15th in the BSc entrance exam in Mechanical Engineering Department among 180 students, BUET, Bangladesh
- PGRA Scholarship Awardee in UTRGV, USA, 2020-2021
- Active membership as a research student of PREM, UTRGV
- Research Assistantship (RA) Awardee at ETSL lab, Purdue University, 2021-Present

Research Interests

Energy Application, Innovative Materials Design, Mechanics of Materials, Control Engineering, Optimization

Research Experiences

Experimental and Numerical Studies of pulsatile Non-Newtonian Flow Behavior along T and Y Junctions
(Sep 2017 – Oct 2018)

- Measuring flow vorticity, flow-filed, velocity field of glycerin-water (50% w/w) solution analogous to blood matrix along the fabricated epoxy channel
- Implementation of Carreau model to visualize non-Newtonian flow behavior of blood matrix by ANSYS Fluent simulation
- Validated the results of flow field, vorticity with the experimental and numerical ones

Antibacterial activities of centrifugally spun PEO/Ag, PEO/Cu and PVP/Cu composite nanofibers

(Jan 2020 – Sep 2020)

- Preparation of composite nanofibers by centrifugal spinning from PEO, PVP polymer solutions with Ag and Cu nanoparticles
- Characterization of nanofibers by SEM, XRD, EDS, TGA tools
- Finest workability of nanofibrous membrane to inhibit bacterial structure at nanoscale level
- Exhibiting 100%, 99.96% and 98.67% inhibition efficiency by PEO/Ag and PEO/Cu, PVP/Cu composite nanofibers

The Effect of Solvent and Molecular Weight on the Morphology of Centrifugally Spun PVP nanofibers

(Feb 2020 – Aug 2020)

- ➢ Generation of continuous and bead free nanofibers from various molecular weights and selected solvents
- ➢ Molecular weight (360,000) of PVP polymer in both solvents resulting into thicker diameter compared to Mw (1,300,000)
- ➢ Displaying highly homogenous porous surface from PVP (Mw 1,300,000)/DMF solution while aqueous solutions showed smooth fibrous surface

Synthesis of SnO_2/TiO_2 micro belt-fibers from polymer composite precursors and applications in LIBs

(Aug 2020 – Feb 2021)

- ➢ Belt shape morphology formation with spherical particles on the surfaces from SnO_2/TiO_2/PVP nanofibers under 700°C heat treatment in air
- ➢ SnO_2/TiO_2/C as anode, delivering 1200 mAh/g capacity initially at 100mA/g; decreased to 279 mAh/g after 100 cycles
- ➢ Columbic efficiency retention 99% throughout cycles, indicating good reversibility

Centrifugally spun uncoated, coated and slurry coated SnO_2/TiO_2/C composite fibers as anode in SIBs

(Nov 2020 – Aug 2021)

- ➢ Implementing three different synthesizing techniques for the uncoated, coated and slurry coated PAN/PMMA/SnO_2/TiO_2 composite fibers
- ➢ Showing huge porosity/defects in PAN/PMMA induced nanofibers facilitating the uniform dispersion of SnO_2/TiO_2 active material
- ➢ Uncoated sample: representing lower capacity fading and more stability than other samples because of the finer in-situ polymerization of precursors
- ➢ SnO_2 coupled with TiO_2 anode; capacity retention amazingly stabilized with good cyclability

EMI shielding effectiveness from magnetite and functionalized MWCNTs polymer composite

(March 2020 – Oct 2020)

- ➢ Forcespun based Fe_3O_4/f-MWCNTs/C nanofibers generation
- ➢ Yielding flexible CNF because of the carbonization at elevated temperature
- ➢ Pronounced Shielding effectiveness due to the optimized concentrated magnetite embedded into porous CNFs with conducting f-MWCNTs

Review paper study experiences

- ➢ Self-healing of metals and metal matrices: A review study   (Feb 2020-Jan 2021)
- ➢ Additive manufacturing of 3D printed Titanium alloy: In depth review analysis on the processing, microstructure, defects, and mechanical properties   (Jan 2020-Dec 2020)

Academic Projects

- • Numerical analysis of a Truss support; "Numerical Analysis Sessional course", 2015
  - ➢ Literature review study on the node analysis of a truss
  - ➢ Development of MATLAB based code for the nodal analysis of a truss body
  - ➢ Calculating forces, moments at various joints
- • Smart robot, shielding thieves from room; "Instrumentation and Measurement Sessional course", 2017
  - ➢ Arduino controlled robots, comparing assigned and non-assigned faces
  - ➢ Python based code development for the path planning of the robot
  - ➢ Experiences on troubleshooting for the control of a robot as a real-life implementation
- • Sliding mode control of a two-link robot manipulator; "Robot Modeling and Control course", 2021
  - ➢ Dealing with dynamics and its behavior of a two-link manipulator
  - ➢ Minimizing the error convergence of joint parameters with designed value
  - ➢ Developing code in MATLAB and SIMULINK for the simulation of convergency

> ➢ Having idea about unknown external disturbance effects on the dynamical behavior
- Nano technological protection against metallic failure of Power-plant, "Nanotechnology course", 2020
  > ➢ Literature study of the failure of metallic components of a power-plant
  > ➢ Presenting nanotechnology based novel idea to get rid of these failure
  > ➢ Focusing sustainable solution for the existent failure of various components of power-plant
- PVD coatings on Tribological Applications, "Tribology course", 2020
  > ➢ Deep study on PVD coating parameters on substrate and its behavior
  > ➢ Representing the effective behavior of PVD coating against extreme situation
  > ➢ Analyzing the performance of tribological rupture due to coating

Graduate Teaching Assistant   Spring 2021
- Teaching assistant at Mechanical Engineering Department, UTRGV, Edinburg, TX
- Grading undergraduate student's answer scripts of "Numerical Methods (MATLAB based)" course
- Conducting Q & A session of that course among 60 students

Internship Experience   March 2018; 20hrs/week
- Engineering Trainee at 225 MW Combined Cycle Power plant Khulna, Bangladesh NWPGCL
- Training in operation and maintenance of 120MW gas turbine and 105MW steam turbine
- Gaining extensive knowledge about the fuel, generation, lubrication, electrical system of the plant

Skills

Machinery
- Auto lab, Arbin, Nova, Gamry
  Battery Analysis tools
- Universal testing machine
- SEM, EDS, TGA, DMA, XRD
- Forcespinning, Electrospinning
- Rheometer, Viscometer
- Lathe, Milling, Shaper operation

Software

- CAD: SolidWorks, AutoCAD
- CAE: ANSYS, COMSOL
- Control: ARDUINO
- Materials: LAMMPS
- Programming: MATLAB, C, C++
- Statistics: Origin Pro, Sigma Plot, Tec plot

Leadership and Extracurricular Activities

Member of non-profit organizations
- Projects for Humanity (http://projects4humanity.org/); 2020-Current; 1hr/week
- Badhon Blood Donating Club, BUET, Bangladesh; 2015-2017; ½ hr/week

Leadership capacity
- Guiding and Conducting a Research hub for writing Review papers; Jan 2020-Present;1hr/week
- Every year, managing and distributing cloths in winter season among poor people in Bangladesh, 2017-2019; 2hrs/week
- Training students at Manarat university, Bangladesh about the mechanical instruments, 2019; 4 weeks