HASIN MAKSURA FEROZ

The Pennsylvania State University

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EDUCATION

The Pennsylvania State University ***May 2017***

Ph.D Candidate, Chemical Engineering, CGPA:3.87/4.00

Advisor: Dr. Manish Kumar

Bangladesh University of Engineering and Technology (BUET) ***March 2012***

B.Sc., Chemical Engineering, CGPA:3.90/4.00 (ranked 1st in class of 62)

RESEARCH EXPERIENCE

- **Characterization of optogenetically relevant microbial opsins**

In collaboration with Dr. John Golbeck, Penn State University and Dr. Mike Blatt, University of Glasgow

Developed an in vitro platform to measure, for the first time, the ion transport rates of light-driven ion pumping membrane proteins (opsins) for potential application in neuroscience.

- Expressed and purified membrane protein, halorhodopsin, a light-driven ion pump expressed in E. *coli*
- Reconstituted the membrane protein into lipid vesicles
- Used fluorescence-based ion detection to quantify single molecule ion transport by membrane proteins reconstituted into lipid vesicles
- Expressed membrane protein in *Xenopus laevis* oocytes for voltage-clamp based measurement of ion transport

- **Downstream processing of membrane proteins for applications in pharmaceuticals and therapeutics**

In collaboration with Dr. Andrew Zydney, Penn State University

Innovated lab-scale technique to concentrate membrane proteins without concentrating detergents for biophysical characterization assays that require complete removal of detergent.

- Analyzed hydrodynamic conditions leading to detergent retention in commercially available lab scale protein concentrators
- Developed an alternative assembly that leads to negligible retention of detergent compared to retention of membrane protein by promoting concentration polarization

- **Carbon nanotubes as nanofibrous mats for ultrafiltration**

In collaboration with Dr. Jessica Schiffman, University of Massachusetts Amherst

Model and experimentally verify the performance of carbon nanotubes as ultrafiltration membranes

- Predict fabrication conditions under which the mats outperform existing ultrafiltration membranes
- Experimentally verify performance of carbon nanotube-based UF membranes

AWARDS/HONORS

- NSF NAMS Stipend Award, North American Membrane Society (NAMS) conference, June 2016
- Paper presentation, College of Engineering Research Symposium, Concentrating Membrane Proteins using Ultrafiltration without Concentrating Detergents, 1st place, April 2016
- Poster Presentation, 94th Annual Graduate Women in Science (GWIS) Meeting, Determining Single Molecule Ion Transport Properties of Light -Driven Membrane Proteins, Runner-up, June 2015
- Poster Presentation, College of Engineering Research Symposium, Characterization of Light-Driven Membrane Proteins for Application in Optogenetics, Runner-up, April 2015
- Elias Klein Travel Award, North American Membrane Society (NAMS) conference, June 2013
- Abhishek, Kar, Guha, Rajarshi, **Feroz, Hasin,** Meng, Yuxi, Sustainable Desalination and Water Recycling Using Chemical Micropumps in Membrane Systems. Dow Sustainability Innovation Challenge, 1st place, 2013
- Dean's List Scholarship, BUET (all academic years)
- University Merit Scholarship, BUET (all academic years)
- Technical Scholarship for Engineering Education in Bangladesh, BUET

PUBLICATIONS

1. **Feroz, Hasin**, Ikwuagwu, B., Vandervelden C., Zydney A. and Kumar M., Concentrating membrane proteins using ultrafiltration without concentrating detergents (Biotechnol. Bioeng.. 2016)
2. Saboe ,Patrick O., Conte, Emelia, Chan, Stanley, **Feroz, Hasin**, Ferlez, Bryan, Sines, Ian T. ,Yan, Hengjing, Bazan, Guillermo C., Golbeck, John and Kumar, M, Biomimetic wiring and stabilization of photosynthetic membrane proteins with block copolymer interfaces (Journal of Materials Chemistry A, accepted)
3. **Feroz, Hasin**, Ferlez B., Blatt M., Hibberd J., Burroughs N., Smirnoff N., Parak W., Golbeck J. and Kumar, M, Measuring single-molecule ion transport properties of halorhodopsin (In preparation)
4. **Feroz, Hasin**, Kumar, M, Synthesis and modeling of carbon nanotube mats as high-performance ultrafiltration membranes (In preparation)
5. **Feroz, Hasin**, Kumar, M, Controlling detergent micelle properties and concentrations during membrane protein processing (In preparation)

CONFERENCES, PRESENTATIONS, POSTER

1. Feroz, Hasin, Vandervelden, Craig, Ikwuagwu, Bon, Ferlez, Bryan, Baker, Carol, Lugar, Daniel J. Grzelakowski, Mariusz, Golbeck, John, Zydney, Andrew and Kumar, Manish, Ultrafiltration to concentrate membrane proteins without concentrating detergents, Poster presented at the North American Membrane Society (NAMS) conference, June 2016
2. Feroz, Hasin M., Ferlez B., Blatt M., Hibberd J., Burroughs N., Smirnoff N., Parak W., Golbeck J. and Kumar, M., Determining single molecule ion transport properties of light-driven membrane proteins, Poster presented at the Biophysical Society (BPS) 59th Annual Meeting, February 2015
3. Feroz, Hasin M., Shen, Yuexiao, Ferlez, Bryan, Golbeck, John H. and Kumar, Manish, Light Driven Desalination Membranes, Poster presented at the North American Membrane Society (NAMS) conference, June 2013
4. Feroz, Hasin M., Nahar, J., Rahman, M. M, Eco-friendly Jute Processing, Journal of Chemical Engineering, IEB, Bangladesh,Volume ChE. 26, No. 1, December 2011
5. Nahar, J.,Feroz, Hasin M., Rahman, M. M., Jute processing: A comparative study, 2nd Annual Paper Meet, Institute of Engineers, Bangladesh (IEB), December, 2011
6. Feroz, Hasin M., Nahar, J., Sabrina, Syeda (2011), Hydrogen by MEC:A Fuel Source for the Future, 3rd International Conference on Chemical Engineering (ICChE), BUET, Dhaka,December 2011

LEADERSHIP, OUTREACH AND PROFESSIONAL MEMBERSHIP

1. Mentor for Science-U Water Camp, The Pennsylvania State University, 2013-2015
2. Penn State Chemical Engineering Safety Committee Member, 2015-present
3. Vice-president, BSA (Bangladesh Student Association) at Penn State, The Pennsylvania State University, 2016
4. North American Membrane Society (NAMS) member, 2013-present
5. American Institute of Chemical Engineers (AIChE) member, 2015-present
6. Organized and anchored ICChE International Conference on Chemical Engineering, BUET, 2012

SKILLS

Recombinant techniques (membrane/soluble protein)	Optical spectroscopy	Bioseparations/ Electrophysiology	Molecular biology/ Immunochemistry	Software
• Cell culture	• TEM, DLS/UV Vis	• FPLC	• Cloning	• MATLAB
• Protein purification	• Confocal microscopy	• HPLC/LC	• Western blot	• Mathematica
• Protein quantification	• Stopped-flow spectroscopy	• Ultrafiltration	• Restriction digestion	• Origin
• Protein characterization		• Voltage clamp		• Illustrator

TEACHING EXPERIENCE

- ***Teaching Assistant for Unit Operations Lab, Chemical Engineering, Penn State University*** ***Fall 2014***
  - Instructed undergraduate students to understand the principle of and experimentally verify separation techniques, including ultrafiltration and HPLC
- ***Research Mentor, Chemical Engineering, The Pennsylvania State University*** ***2013-Present***
  - Mentored high school and undergraduate students to conduct research independently in the lab (2 high school students and 14 undergraduates)
  - Mentored students in the Research Experience for Undergrads (REU) program, 1st prize to REU mentee at REU symposium, The Pennsylvania State University
- ***Lecturer, Chemical Engineering, BUET*** ***Apr 2012-June 2012***
  - Planned, coordinated and instructed undergraduate courses-material balance, unit operation lab
  - Organized industrial tours for undergraduate student

REFERENCES

Dr. Manish Kumar, Penn State University. Email: mxk64@psu.edu
Dr. Andrew Zydney, Penn State University. Email: zydney@engr.psu.edu
Dr. Mike Blatt, University of Glasgow. Email:michael.blatt@glasgow.ac.uk