MATTHEW C. CHAN

Mahan Postdoctoral Fellow
Fred Hutchinson Cancer Center
Seattle, Washington 98109
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Education

University of Illinois Urbana-Champaign **Urbana, IL**
Ph.D. Chemical and Biomolecular Engineering 2022
Dissertation: Molecular Mechanisms of Neurotransmitter Transport in Neurons
Advisor: Dr. Diwakar Shukla

M.S. Chemical and Biomolecular Engineering 2020

University of Alabama at Birmingham **Birmingham, AL**
B.S. Biomedical Engineering 2017
Double major: Applied Mathematics and Scientific Computation
magna cum laude, with Distinguished Honors

Research Experiences

Research interests: Protein structure and dynamics, structural biology, membrane proteins, molecular dynamics simulations, cryo-electron microscopy

Fred Hutchinson Cancer Center **Seattle, WA**
Mahan Postdoctoral Fellow 2022-Present
Advisors: Dr. Arvind (Rasi) Subramaniam, Dr. Melody G. Campbell, Basic Science Division

University of Illinois Urbana-Champaign **Urbana, IL**
Graduate Research Assistant 2017 - 2022
Advisor: Dr. Diwakar Shukla, Department of Chemical and Biomolecular Engineering
Research projects:

- Molecular dynamics simulations and Markovian modeling to characterize membrane transport protein structure and dynamics
- Substrate induced conformational dynamics and molecular regulation of neurotransmitter transporters
- Machine learning models to predict the effect of amino acid variants
- Elucidating the transport mechanism of bicarbonate transporters to enhance photosynthetic yield

University of Alabama at Birmingham **Birmingham, AL**
Undergraduate Research Assistant 2013 - 2017
Advisor: Dr. Margaret A. Johnson, Department of Chemistry
Research projects:

- Structural determination of coronaviral nucleic-acid binding domains
- Biochemical characterization of poly(ADP-ribose) polymerases

Peer-Reviewed Publications

(*) denotes equal authorship

9. **M. C. Chan**, Y. Alfawaz, D. Shukla, "Molecular Mechanism of Substrate Transport and Dynamics of the Cyanobacteria Bicarbonate Transporter BicA", *In review.*

8. **M. C. Chan**, K. K. Chan, E. Procko, D. Shukla, "Machine Learning Guided Design of High Affinity ACE2 Decoys for SARS-CoV-2 Neutralization", *In review.*

7. H. J. Young*, **M. C. Chan***, B. Selvam, S. K. Szymanski, D. Shukla, E. Procko, "Deep Mutagenesis of a Neurotransmitter Transporter for Uptake of a Non-native Substrate Informs how Sequence Features Relate to Conformational Dynamics", *In review.*

6. **M. C. Chan**, E. Procko, D. Shukla, "Structural Rearrangement of the Serotonin Transporter Intracellular Gate Induced by Thr276 Phosphorylation", *ACS Chemical Neuroscience*, 13 (7), 933-945, (2022).

5. **M. C. Chan***, B. Selvam*, H. J. Young, J. Park, E. Procko, D. Shukla, "The Substrate Import Mechanism of the Human Serotonin Transporter", *Biophysical Journal*, 121 (5), 715-730, (2022).

4. L. Zhang, S. Dutta*, S. Xiong*, **M. Chan***, K. K. Chan, T. M. Fan, K. L. Bailey, M. Lindebald, L. M. Cooper, L. Rong, A. F. Gugliuzza, D. Shukla, E. Procko, J. Rehman, A. B. Malik, "An Engineered High-Affinity ACE2 Peptide Therapeutically Mitigates Lung Vascular Injury and Mortality Induced by Distinct SARS-CoV-2 Variants", *Nature Chemical Biology*, 18 (3), 342–351, (2022).

3. **M. C. Chan**, D. Shukla, "Markov State Modeling of Membrane Transport Proteins", *Journal of Structural Biology*, 213 (4), 107800, (2021).

2. D. T. Bregante, **M. C. Chan**, J. Z. Tan, E. Z. Ayla, C. P. Nicholas, D. Shukla, D. W. Flaherty, "The Shape of Water in Zeolites and its Impact on Oxidation Catalysis", *Nature Catalysis*, 4 (9), 797–808, (2021).

1. Z. Shamsi, **M. Chan**, D. Shukla, "TLmutation: Predicting the Effects of Mutations Using Transfer Learning", *The Journal of Physical Chemistry B*, 124 (19), 3845-3854, (2020).

Book Chapters

1. R. G. Hammond, X. Tan, **M. Chan**, A. Goel, M. A. Johnson, "Computational and Experimental Studies of ADP-Ribosylation", in *Methods in Molecular Biology: Poly(ADP-Ribose) Polymerase*, A. Tulin (ed.), Springer, 2017.

Presented Works

12. **M. C. Chan**, H. J. Young, B. Selvam, S. K. Szymanski, E. Procko, D. Shukla, "Mechanism of neurotransmitter transport and regulation revealed by high throughput experiments and simulations", 2nd Annual CAREER Awardee Conference, Molecular and Cellular Biosciences, National Science Foundation, Virtual Conference, November, 2021.

11. **M. Chan**, "The Substrate Import Mechanism of the Human Serotonin Transporter", 18th Annual ChBE Graduate Student Symposium, University of Illinois at Urbana-Champaign, Urbana, IL, October 2019. **3rd prize poster presentation.**

10. **M. Chan**, "Substrate Induced Conformational Transitions of the Human Serotonin Transporter", American Chemical Society National Meeting, San Diego, CA, August 2019.

9. **M. Chan**, B. Selvam, H. Young, E. Procko, D. Shukla, "Substrate Import Mechanism of the Human Serotonin Transporter", Rare Events: Applications, Computations, and Theory. Indian Institute of Science, Bangaluru, India, July 2019.

8. **M. Chan**, "Substrate Import Mechanism of the Human Serotonin Transporter", Midwestern Thermodynamics and Statistical Mechanics Conference, University of Illinois at Urbana-Champaign, Urbana, IL, June 2019.

7. **M. Chan**, D. Chasteen-Boyd, M. Collier, S. Holder, A. Eberhardt, "A Design for an Independent Alarm Clock for the Deaf-Blind", 10th Annual UAB EXPO, Birmingham, AL, April 2017.

6. **M. Chan**, D. Chasteen-Boyd, M. Collier, S. Holder, A. Eberhardt, "A Design for an Independent Alarm Clock for the Deaf-Blind", 2017 Design for Medical Devices Conference, University of Minnesota, Minneapolis, MN, April 2017.

5. **M. Chan**, "Coronavirus Macrodomains: Bridging the gap between structure and function", 45th Annual Southeastern Magnetic Resonance Conference, Atlanta, GA, October 2016.

4. **M. Chan**, K. Villavicencio, R. G. Hammond, X. Tan, M. A. Johnson, "A Biochemical Investigation of Novel Noncanonical Coronavirus Macrodomains", 9th Annual UAB EXPO, Birmingham, AL, April 2016.

3. **M. Chan**, K. Hayes, R. G. Hammond, C. Tian, X. Tan, M. A. Johnson, "Biochemical Characterization of Noncanonical Coronavirus Macrodomains", 67th Southeastern Regional Meeting/ 71st Southwestern Regional Meeting of the American Chemical Society, Memphis, TN, November 2015.

2. **M. Chan**, R. G. Hammond, X. Tan, C. Tian, M. A. Johnson, "Characterization and Biochemical Analysis of Noncanonical Coronavirus Macrodomains", 2015 UAB Summer Research EXPO, Birmingham, AL, July 2015.

1. **M. Chan**, M. S. Pasala, R. G. Hammond, C. Tian, M. A. Johnson, "Cloning, Expression, and Characterization of Recombinant Coronavirus Macrodomains", 2014 UAB Summer Research EXPO, Birmingham, AL, July 2014.

Teaching Assistantships

Heat and Mass Transfer, UIUC	Spring 2020
Process Controls and Dynamics, UIUC	Fall 2019
Rare Events Workshop, IISC, Bengaluru, India	Summer 2019
Principles of Chemical Engineering, UIUC	Fall 2018
General Chemistry Lab, UAB	Fall 2014 - Spring 2017
Engineering Graphics, UAB	Fall 2014

Honors and Awards

Mahan Postdoctoral Fellowship, Fred Hutchinson Cancer Center	2022
A. T. Widiger Chemical Engineering Fellowship, UIUC	2022
NSF MolSSI Graduate Student Seed Fellowship	2021
School of Chemical Sciences Image Challenge Finalist, UIUC	2020

List of Teachers Ranked Excellent, UIUC	2020
3rd Prize Poster Presentation, UIUC	2019
School of Chemical Sciences Graduate Teaching Award, UIUC	2019
List of Teachers Ranked Excellent, UIUC	2018
School of Chemical Sciences Image Challenge Finalist, UIUC	2018
DMD Student Design Showcase Finalist	2017
Office of Undergraduate Research Travel Grant, UAB	2017
School of Engineering Travel Award, UAB	2017
SEMRC Student Travel Award	2016
AACS Undergraduate Student Travel Award	2015
Francis J. Dupuis Engineering Scholarship, UAB	2014 - 2017
Jane Knight Lowe Fellow, UAB	2013 - 2017