

# ISMAIL A. AHMED

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## CURRENT POSITION

**New York University Grossman School of Medicine**  
Laboratory of Professor Robert Froemke  
Postdoctoral Research Fellow, Neuroscience

New York, NY  
09/2019 – present

## EDUCATION

**University of Pennsylvania, School of Medicine**  
Ph.D. in Biochemistry and Molecular Physics

Philadelphia, PA  
08/2012 – 05/2019

Advisor: Dr. Feng Gai

Thesis: *The Development of Unnatural Amino Acid-Based Probes and Methods for Biological Studies*

**The City College of New York (CUNY)**  
B.S. in Biochemistry with Honors

New York, NY  
08/2006 – 09/2011

Advisor: Dr. Ronald Koder

Thesis: *Measuring Cofactor Binding in Designer Heme-Binding Proteins*

## RESEARCH INTERESTS

Broadly, my interests center around how neuropeptides such as oxytocin and vasopressin modulate social behavior in health and disease. My research program leverages a multidisciplinary approach that combines the development of advanced chemical and molecular tools for real-time tracking and manipulation of neuropeptides in living organisms, alongside a range of methods, including optical techniques, electrophysiology, pharmacology, and behavioral analysis.

## GRANTS AND AWARDS \*completed research grants are marked with an asterisk

**Career Awards at the Scientific Interface (CASI)**  
Burroughs Wellcome Fund

**\$500,000**  
2023 – 2028

**Scholar to Faculty Pathway Award**  
NYU Grossman School of Medicine

**\$160,000**  
2023 – 2025

**Postdoctoral Enrichment Program Fellowship**  
Burroughs Wellcome Fund

**\$60,000**  
2021 – 2024

**NIH Blueprint D-SPAN Award (K00)**  
National Institute of Mental Health (NIMH)  
Grant Number: 8K00 MH123667

**\$318,800**  
2019 – 2023

**NIH F99 Blueprint D-SPAN Award (F99)\***  
National Institute of Mental Health (NIMH)  
Grant Number: 1F99 NS108544

**\$55,000**  
2018 – 2019

**NIH T32 Interdisciplinary Cardiovascular Training Grant\***  
University of Pennsylvania  
Grant Number: T32 HL007954

**\$90,000**  
2016 – 2018

**NIH PREP Scholar\***  
Case Western Reserve University  
NIH R25GM075207

**\$24,000**  
2011 – 2012

**NIGMS MARC USTAR Grant\***  
City College of New York  
Grant Number: 25 T34-GM007639-29

**\$30,000 + Full Tuition Support**  
2010 – 2012

## **RESEARCH EXPERIENCE**

### **New York University Grossman School of Medicine**

Postdoctoral Research Fellow (Neuroscience) | Advisor: Dr. Robert Froemke

New York, NY

09/2019 – present

*Thesis: Chemical Tools to Control and Detect Oxytocin Signaling in vivo*

- Developed and validated photoactivatable oxytocin analogs for spatiotemporal control of oxytocin signaling in neuronal in non-neuronal tissue to better understand maternal behavior and physiology
- Demonstrated photoactivatable oxytocin analogs are useful tools for driving maternally relevant social behavior and physiological processes such as milk let-down and uterine contractions
- Designed an optically trackable, click-oxytocin analog to resolve oxytocin localization based on route of therapeutic administration (internasal, interperineal, intracerebroventricular etc.) used to treat neuropsychiatric disorders with hallmark symptoms of social deficits (autism, depression, and more)

### **Riken Center for Brain Science**

IBRO-Riken Center for Brain Science Summer Program

Theme: Neurotechnology | 1-week workshop on how to use chemical technology to understand the brain.

Wako, Japan

06/2019 – 07/2019

### **University of Pennsylvania, School of Medicine**

Graduate Student Researcher | Advisor: Dr. Feng Gai

Philadelphia, PA

08/2012 – 05/2019

*Dissertation: The Development of Unnatural Amino Acid-Based Probes and Methods for Biological Studies*

- Engineered and characterized minimally modified unnatural amino acid and nucleic acid analogs for biological microscopy and spectroscopy applications
- Applied various unnatural amino acids as sensors to monitor protein conformational changes, structure, dynamics, local pH, hydration, protease activity, peptide membrane penetration, and other biologically relevant processes in health and disease states

### **Case Western University (NIH PREP Program)**

Postbaccalaureate Researcher | Advisor: Dr. Matthias Buck

Cleveland, OH

08/2011 – 07/2012

*Investigation of the interactions of the small GTPase, plexin with Calmodulin and its role in cell motility*

### **The City College of New York (CUNY)**

Undergraduate Research Assistant | Advisor: Dr. Ronald Koder

New York, NY

08/2006 – 09/2011

*Measuring Cofactor Binding in Designer Heme-Binding Proteins (Honors Thesis)*

## **TEACHING & MENTORING EXPERIENCE**

UPenn High School Biomedical Research Academy

*Lead Journal Club Instructor*

Summer, 2018

UPenn, Department of Chemistry: Grant Writing Seminar

*Teaching Assistant*

Spring, 2018

UPenn, Upward Bound Academy

*Laboratory Instructor*

Summer 2012-2014

### **Past Mentees:**

Carina Wong (Barnard)

*Undergraduate Research Assistant*

Summer 2023

Kelsey Wun (NYU)

*Undergraduate Research Assistant*

2022 – 2023

Michelle Qu (Touro College of Osteopathic Medicine)

*Medical Research Assistant*

2021 – 2022

Ayo Adewakun, (NYU) <i>Undergraduate Research Assistant</i>	2020 – 2022
Sydney Hart, (NYU) <i>Graduate Rotation Student</i>	2020 – 2021
Christina Eng, (UPenn) <i>Undergraduate Research Assistant</i>	2017 – 2019
Lilliana Ortiz Rodriguez, (U of Puerto Rico, Humacao) <i>Undergraduate Research Assistant</i>	2016 – 2018
Mariana León Berríos (U of Puerto Rico, Cayey) <i>Undergraduate Research Assistant</i>	2016 – 2018

## **PUBLICATIONS** (\*asterisk denotes co-first authorship)

- Ahmed IA**, Liu J, Gieniec KA, Bair-Marshall CJ, Adewakun AB, Hetzler BE, Arp C, Khatri L, Vanwalleghem GC, Seidenberg AT, Cowin P, Trauner D, Chao MV, Tsien RW, Davis FM, Froemke RC. “Optopharmacological tools for precise spatio-temporal control of oxytocin signaling in the central nervous system and periphery.” *BioRxiv* (2022). (Currently Under revision at *Nature Methods*)
- Ahmed I**, Armstrong A, Clemons TA, Clune-Taylor C, Love-Rutledge ST, Phillips MA, Rogers CD, Williams MJ. How do DEI initiatives impact STEM, and why do we still need them? *Cell* (2023) 186(12):2506-2509.  
  
*This publication emphasizes the ongoing significance of maintaining DEI initiatives within our communities. It focus on detailing my personal endeavors aimed at fostering a more inclusive and fair scientific community.*
- Fong KP, **Ahmed IA**, Mravic M, Jo H, Kim OV, Litvinov RI, Weisel JW, DeGrado WF, Gai F, Bennett JS. “Visualization of Platelet Integrins via Two-Photon Microscopy Using Anti-transmembrane Domain Peptides Containing a Blue Fluorescent Amino Acid.” *Biochemistry*. (2021) Jun1;60(21):1722-1730.
- Micikas RJ\*, **Ahmed IA\***, Acharyya A, Smith AB, Gai F. “Tuning the electronic transition energy of indole via substitution: application to identify tryptophan-based chromophores that absorb and emit visible light.” *Phys Chem Chem Phys*. (2021) Mar 21;23(11):6433-6437.
- Ahmed IA**, Rodgers JM, Eng C, Troxler T, Gai F. “PET and FRET utility of an amino acid pair: tryptophan and 4- cyanotryptophan.” *Phys Chem Chem Phys*. (2019) Jun 28;21(24):12843-12849.
- Zhang K\*, **Ahmed IA\***, Kratochvil HT, DeGrado WF, Gai F, Jo H. “Synthesis and application of the blue fluorescent amino acid l-4-cyanotryptophan to assess peptide-membrane interactions.” *Chem Commun* (Camb). (2019) Apr 25;55(35):5095-5098.
- Ahmed IA**, Acharyya A, Eng CM, Rodgers JM, DeGrado WF, Jo H, Gai F. “4-Cyanoindole-2'-deoxyribonucleoside as a Dual Fluorescence and Infrared Probe of DNA Structure and Dynamics.” *Molecules*. (2019) Feb 8;24(3):602.
- Hilaire MR\*, **Ahmed IA\***, Lin CW, Jo H, DeGrado WF, Gai F. “Blue fluorescent amino acid for biological spectroscopy and microscopy.” *Proc Natl Acad Sci U S A*. (2017) Jun 6;114(23):6005-6009.
- Ahmed IA**, Gai F. Simple method to introduce an ester infrared probe into proteins. *Protein Sci*. (2017) Feb;26(2):375-381.
- Markiewicz BN, Lemmin T, Zhang W, **Ahmed IA**, Jo H, Fiorin G, Troxler T, DeGrado WF, Gai F. “Infrared and fluorescence assessment of the hydration status of the tryptophan gate in the influenza A M2 proton channel.” *Phys Chem Chem Phys*. (2016) Oct 19;18(41):28939-28950.
- Pazos IM\*, **Ahmed IA\***, Berríos MI, Gai F. “Sensing pH via p-cyanophenylalanine fluorescence: Application to determine peptide pKa and membrane penetration kinetics.” *Anal Biochem*. (2015) Aug 15;483:21-6.
- Mutter AC, Norman JA, Tiedemann MT, Singh S, Sha S, Morsi S, **Ahmed I**, Stillman MJ, Koder RL. “Rational design of a zinc phthalocyanine binding protein.” *J Struct Biol*. (2014) Feb;185(2):178-85
- Zhang L, Anderson JL, **Ahmed I**, Norman JA, Negron C, Mutter AC, Dutton PL, Koder RL. “Manipulating cofactor binding thermodynamics in an artificial oxygen transport protein.” *Biochemistry*. (2011) Nov

29;50(47):10254-61.

14. Mukherjee D\*, **Ahmed IA\***, Gai F. "Site-specific Interrogation of Protein Structure and Stability." *Methods Mol Biol.* (2022) 2376:65-87. | Book chapter in Volume 685 "New Experimental Probes for Enzyme Specificity and Mechanism" edited by John P. Richard and Graham R. Moran.
15. Acharyya A\*, **Ahmed IA\***, Gai F. "4-Cyanoindole-based fluorophores for biological spectroscopy and microscopy." *Methods Enzymol.* (2020) 639:191-215. | Book chapter in Volume 639 "Chemical Tools for Imaging, Manipulating, and Tracking Biological Systems: Diverse Methods for Optical Imaging and Conjugation" edited by David M. Chenoweth.

## **SELECT HONORS & AWARDS**

2023 – 2028	Burroughs Wellcome Fund Career Awards at the Scientific Interface (CASI) Award
2023 – 2025	NYU Grossman School of Medicine Scholar to Faculty Pathway Award
2023	Intersections Science Fellow, Yale
2022	Rising Stars in Biomedical Engineering, Columbia and Johns Hopkins University
2022	Optogenetics Gordon Research Conference (OptoGRC) Excellence in Citizenship Award
2022	The Carl Storm Underrepresented Minority Fellowship
2021 – 2024	Burroughs Wellcome Fund Postdoctoral Enrichment Program (PDEP) Fellowship
2021	Neuroscience Scholars Program Associate ( <i>Society for Neuroscience</i> )
2021	1000 Inspiring Black Scientists in America, Rising Star ( <i>Cell Press</i> )
2020	NIH Loan Repayment Program under Pediatric (National Institute of Mental Health (NIMH))
2020	100 More Inspiring Black Scientists, Rising Star ( <i>Cell Press</i> )
2019	IBRO-RIKEN CBS Summer Program Travel Grant
2019	UPenn graduate nominee for Regeneron Prize for Creative Innovation
2018	Rising Stars in Biomedical, MIT
2019 – 2023	NIH F99/K00 Blueprint D-SPAN Award, National Institute of Mental Health (NIMH)
2018	UPenn Biomedical Graduate Studies Travel Award
2017	Leslie Dutton Award (best paper published by UPenn BMB graduate student)
2017	Fontaines Society, UPenn Research Travel Award
2011	Golden Key Honor Society
2011	Ira and Cecille Weber Scholarship in Biomedical Research, City College
2009	Anne S. Kheel Scholarship in Community Service, City College

## **INVITED RESEARCH SEMINARS**

09/2023	Symposium of the Center for Neuroendocrine Studies, UMass Amherst
09/2023	Cell Biology and Neuroscience Department Seminar, Rutgers
09/2023	PRIMED Symposium, NYU Dental
06/2023	Princeton Neuroscience Institute, TigerBrain: Postdoc Scholars Symposium
05/2023	American Society for Pharmacology and Experimental Therapeutics (ASPET), St. Louis, MO
04/2023	Center for Translational Social Neuroscience, Emory University
02/2023	SYNAPSES Postdoctoral seminar series, Yale
01/2023	Emerging Leaders in Neuroscience, Weill Cornell
11/2022	Imaging in the Bay Symposium, UC Berkeley

11/2022 Wu Tsai Neuroscience Institute, Stanford University  
 11/2022 Laboratory of Neuroendocrinology Seminar (LNE) Series, UCLA  
 09/2022 Postdoctoral Rising Stars Symposium, University of Utah  
 09/2022 Neurocircuitry of Social Behavior Keystone Symposia, Daejeon, South Korea  
 06/2022 Society for Behavioral Neuroendocrinology, Atlanta  
 06/2022 Oxytocin / Vasopressin Workshop, Erice, Italy  
 04/2022 The City College of New York, Dept. of Biology  
 04/2022 NYU Dental, Pain Research Center  
 03/2022 Pace University, Dept. of Biology  
 03/2022 NYU Langone, Neuroscience Institute  
 03/2021 NYU Langone, Neuroscience Institute, Oxytocin Group  
 03/2021 UPenn, Biology Dept.  
 03/2020 American Chemical Society (ACS) Spring Meeting  
 (Biomembrane Synthesis, Structure, Mechanics & Dynamics)  
 12/2020 The City College of New York, Dept. of Biology  
 01/2019 NYU Langone, The Skirball Institute of Biomolecular Medicine  
 01/2019 MIT Media Lab, Synthetic Neurobiology Group  
 04/2018 The College of New Jersey, Dept. of Chemistry  
 11/2017 UPenn Biochemistry and Biophysics. Dept. Annual Retreat (received from Dutton Award)

### **SERVICE, OUTREACH & DEI ACTIVITIES**

2023 *Symposium Co-Chair* | Chemical Tools in Neuroscience, Mediterranean Neuroscience Society  
 2023 *Symposium Chair* | Molecular Tools in Neuroscience, Society for Neuroscience  
 2021 – Present *Committee Member* | Society for Neuroscience, Trainee Advisory Committee  
 2020 – Present *Founder and Director* | BioDiverseStory: BIPOC Scientists Speaker Series, NYU  
 2021 – 2022 *Committee Member* | CoNNExINS Colloquium Planning Committee, NYU Neuroscience  
 2020 – 2022 *Mentor* | Clear Direction, NYU (1-on-1 STEMM mentoring of high school students)  
 2020 – 2022 *Committee Member* | Diversity, Equity, Inclusion (DEI) Committee, Skirball Institute, NYU  
 2019 – 2022 Diversity Initiative Lead | NYU Neuroscience Outreach Group (NOGN)  
 2016 – 2017 *Committee Member* | UPenn Graduate School's Equity & Access Committee  
 2015 – 2016 *Graduate Representative* | for UPenn's Biomedical Graduate Student Assembly

### **PROFESSIONAL MEMBERSHIPS**

2019 – present Society for Neuroscience (SfN)  
 2016 – present American Chemical Society (ACS)  
 2009 – present Society for Advancement of Chicanos/Hispanics and Native Americans in Science (SACNAS)