

Raphael Onuku

PhD Candidate, Cichewicz Lab,
Department of Medicinal Chemistry,
University of Michigan, Ann Arbor

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Education

University of Michigan, Ann Arbor, Michigan

PhD Candidate, Medicinal Chemistry Current
M.S. in Medicinal Chemistry (embedded) 2025

Taipei Medical University, Taipei, Taiwan

M.S. in Pharmacy (Medicinal Chemistry) 2023
Thesis: *Rational Design of Celecoxib-Based HDAC Inhibitors as Potent Anti-Glioblastoma Agents*

University of Nigeria, Nsukka, Nigeria

Bachelor of Pharmacy (BPharm) 2017
Thesis: *Repurposing Drugs to Find HIV-1 Protease Inhibitors: A Virtual Study*

Research Experience

Graduate Student Research Assistant Aug 2023 - Present

Department of Medicinal Chemistry, University of Michigan, Ann Arbor, Michigan

- Cichewicz Lab: (1) Conduct peptide synthesis and applied computational drug discovery research in an anti-infective discovery setting. (2) Advance cyclic peptide and small-molecule research projects through laboratory execution, literature analysis, and collaborative project development.
- Brooks Lab: Comparative evaluation of CDocker and AutoDock Vina docking protocols using Tanimoto coefficient-based selection of active and inactive compounds for PIN1.
- Cernak Lab: Structural prediction and analysis of CTHRC1 in sea turtle fibropapillomatosis using homology modeling.
- Sztain Lab: Investigated binding and interaction of nirmatrelvir with SARS-CoV-2 main protease using molecular dynamics.

Pre-Doctoral Intern Jun 2023 - Jul 2023

Institute of Chemistry, Academia Sinica, Taipei, Taiwan

- David Wu's Lab: Explored hydrogel formation of A3K3 peptide through molecular dynamics simulation.

Graduate Student Research Assistant Jan 2022 – Jul 2023

School of Pharmacy, Taipei Medical University, Taipei, Taiwan

- Contributed to medicinal chemistry research during master's training focused on anti-glioblastoma agent development.

Volunteer Research Assistant (For reference, this was a remote position) Feb 2019 – Nov 2024

Department of Pharmaceutical and Medicinal Chemistry, University of Nigeria, Nsukka, Nigeria

- Supported medicinal chemistry research projects spanning natural products, virtual screening, and anti-infective discovery.

Voluntary Research Assistant / Intern Pharmacist Jan 2018 – Jan 2019

Department of Pharmaceutical and Medicinal Chemistry, University of Nigeria, Nsukka, Nigeria

- Assisted with research and training activities while completing internship responsibilities.

Undergraduate Research Assistant

Jan 2016 – Nov 2017

Department of Pharmaceutical and Medicinal Chemistry, University of Nigeria, Nsukka, Nigeria

- Participated in undergraduate research within pharmaceutical and medicinal chemistry.

Teaching Experience

MEDCHEM 510, Principles of Drug Action II

Winter 2026

Department of Medicinal Chemistry, University of Michigan, Ann Arbor, Michigan

- Graduate Student Instructor.

PHM 231, Pharmaceutical Chemistry

Jan 2017 – Jul 2021

Department of Medicinal Chemistry, University of Nigeria, Nsukka, Nigeria

- Teaching assistant, course co-designer with Dr. Charles Nnadi

Volunteer STEM Instructor

Feb 2012 – Oct 2016

Model Secondary School, Nsukka, Nigeria

- High School Teacher.

Peer-Reviewed Publications

1. Shen CJ, Chen HC, Lin CL, Thakur A, **Onuku R**, Chen IC, Li HY, Chang KY, Chuang JY, Yang WB, Lin HY, Shen YR, Liou JP, Chang WC, Hsu TI. Contribution of Prostaglandin E2-induced neuronal excitation to drug resistance in glioblastoma countered by a novel blood-brain barrier crossing celecoxib derivative. *Adv Sci (Weinh)*. 2025; e06336. doi:10.1002/advs.202506336.
2. Mishra A, Thakur A, Sharma R, **Onuku RS**, Kaur C, Liou JP, Hsu SP, Nepali K. Scaffold hopping approaches for dual-target antitumor drug discovery: opportunities and challenges. *Expert Opin Drug Discov*. 2024;19(11):1355-1381. doi:10.1080/17460441.2024.2409674.
3. Ibezim A, **Onuku RS***, Ottih C, Ezeonu I, Onoabedje E, Ramanathan K, Nwodo N. New sulphonamide-peptide hybrid molecules as potential PBP2a ligands and methicillin-resistant *Staphylococcus aureus* actives. *J Biomol Struct Dyn*. 2023;41(14):6684-6694. doi:10.1080/07391102.2022.2111359.
4. Nnadi CO, **Onuku RS***, Ayoka TO, Okorie NH, Nwodo NJ. Chemical constituents of *Combretum dolichopetalum*: characterization, antitrypanosomal activities and molecular docking studies. *Trop J Pharm Res*. 2022;21(4):801-808. doi:10.4314/tjpr.v21i4.17.
5. Ekpo MD, Xie J, Liu X, **Onuku RS**, Bofo GF, Tan S. Incorporating cryopreservation evaluations into the design of cell-based drug delivery systems: an opinion paper. *Front Immunol*. 2022;13:967731. doi:10.3389/fimmu.2022.967731.
6. Ibezim A, **Onuku RS**, Ibezim A, Ntie-Kang F, Nwodo NJ, Adikwu MU. Structure-based virtual screening and molecular dynamics simulation studies to discover new SARS-CoV-2 main protease inhibitors. *Sci Afr*. 2021;14:e00970. doi:10.1016/j.sciaf.2021.e00970.

ORCID: orcid.org/0000-0003-2564-2109, *equal contributions

Invention Disclosure

Onuku R. Institutional invention disclosure from master's thesis: *Celecoxib-Based HDAC Inhibitors as Potent Anti-Glioblastoma Agents*. Taipei Medical University, 2023. Listed on disclosure record; inventors of record: Liou JP; Hsu TI.

Honors, Awards, and Grants

- Potential Made Possible Scholarship, CEW+ Scholarship Program, University of Michigan, 2026- 2027
- College of Pharmacy (COP) Fellowship, University of Michigan 2023- 2025
- Certificate of Achievement for Successful Advancement to Candidacy, College of Pharmacy, University of Michigan 2025
- Rackham Conference Travel Grant, University of Michigan 2024
- Eugene and Shirley Cordes Scholarship, Department of Medicinal Chemistry, University of Michigan 2023
- Outstanding Graduate Student Award, Ministry of Education and Ministry of Foreign Affairs, Republic of China (Taiwan) 2023
- Falling Walls Lab Taipei Award Winner, "Breaking the Wall of Multi-Drug-Resistant Malaria" 2022
- Taiwan Government Scholarship, Ministry of Education, Republic of China (Taiwan) 2021

Selected Presentations and Scientific Meetings

- Computational Medicinal Chemistry School, Novartis Institutes for Biomedical Research, Cambridge, Massachusetts (**Poster**) 2024
- 2nd Canadian Peptide and Protein Community Virtual Meeting, "Emerging Peptide and Protein Science" (**Poster**) 2024
- LatinXChem Twitter Conference, "Repurposing Drugs to Find HIV-1 Protease Inhibitors: A Virtual Study" (**Poster**) 2020
- 28th International Electronic Conference on Synthetic Organic Chemistry, Virtual 2024
- 16th EFMC-YSN MedChemBioOnline, "Best Practices in Hit-to-Lead Optimization" 2023
- Medicinal Chemistry Symposium, Pharmaceutical Society of Taiwan 2022
- 3rd Asian Pharmacometrics Network Symposium 2021
- International Conference on Data Science in Biology 2020

Professional Development and Certifications

- Bloodborne Pathogen Training for Research Labs, University of Michigan, Certificate 2023
- Chemical Laboratory Safety, University of Michigan, Certificate 2023
- Responsible Conduct of Research and Scholarship, University of Michigan, Certificate 2023
- Laboratory Biosafety and Biosecurity, Public Health Agency of Canada, Certificate 2023
- Good Citation Behavior, Web of Science Academy, Certificate 2023
- Drug Discovery, University of California San Diego (Coursera), Certificate 2022
- Docking, QSAR and Molecular Dynamics, Ramaiah University of Applied Sciences with IEEE-EMB MSRIT and SRIGEN 2020

Leadership, Memberships, and Service

- Member, *Sigma Xi, The Scientific Research Honor Society* 2026 – Present
- Member, *Alpha Chapter of the Rho Chi Society* 2026 - Present
- Founder and Executive Director, *Raphael Onuku Foundation* 2024 - Present
- Elected Representative, Biological and Health Sciences Division, *Rackham Student Government, University of Michigan* 2024 - 2025
- Student Advisory Board Member, *Ginsberg Center, University of Michigan* 2024 - 2025
- Member, *National Center for Faculty Development and Diversity* 2023 - Present
- Member, ACS Medicinal Chemistry Division, University of Michigan Student Chapter 2023 - Present
- Member, *National Organization for the Professional Advancement of Black Chemists and Chemical Engineers* 2023-Present
- President, *Taipei Medical University International Students Association* 2022 - 2023
- Member, *Visibility STEM Africa* 2020 - Present
- Member, *University of Nigeria Alumni Association* 2017 - Present

Technical Skills

- Computational chemistry: Docking (Glide, AutoDock Vina, MOE), molecular dynamics (GROMACS, Desmond), modeling (MODELLER), and visualization (PyMOL, VMD)
- Programming: Python automation, data analysis, and reporting
- Peptide chemistry: Fmoc solid-phase peptide synthesis, macrocyclization, HPLC, and LC-MS