

# Muhammad Zeeshan

<http://zschem.github.io>

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## OBJECTIVE

Ph.D. Material Chemistry with expertise in polymer chemistry, lipid biochemistry, and nanobiotechnology, specifically focused on developing next-generation polymer-lipid nanodiscs (VEMA, SMALP) for the structural and functional characterization of membrane proteins. Proven track record in complex synthetic methodologies (RAFT, VEMA copolymerization), advanced instrumental analysis (EPR, DLS, NMR, SEC), and a strong publication record, including first-author papers in high-impact journals.

## EDUCATION

### MIAMI UNIVERSITY OH, USA

#### PHD MATERIAL CHEMISTRY

Polymers, Lipid, Nanodiscs

#### MS MATERIAL CHEMISTRY

Polymers, Lipid, Nanodiscs

### GCUF FAISALABAD, PAKISTAN

#### MS PHYSICAL CHEMISTRY

Industrial wastewater treatment

### AIOU ISLAMABAD, PAKISTAN

#### MEd-MASTERS OF EDUCATION

## SKILLS

### WET LAB SKILLS

RAFT CTA Synthesis • Kinetics of Polymerization • Polymer synthesis  
Polymer-Lipids interactions • Lipid nanodiscs • Vesicles • EPR Analysis • Material Characterization • Industrial Dyes Degradation • Gamma Irradiation

### INSTRUMENTATION

NMR (DOSY, Proton) • DLS • TEM • SEM • EPR • SEC • GPC • UV-VIS Spectroscopy • FTIR • AAS • ICP-OES • GC-MS • DSC • Instron • 3D Printing

### SOFTWARE

KeleidaGraph • Topspin • Adobe Illustrator • Autodesk Fusion • Python (moderate) • Microsoft Office (Word, PowerPoint etc) • Fiji/ImageJ

## RESEARCH EXPERIENCE

### KONKOLEWICZ LAB | RESEARCH ASSISTANT

Jan 2021 – Present | Miami University, USA

- Explored kinetics of Vinyl Ethers interaction with Maleic Anhydride to form VEMA copolymer.
- Confirmed VEMA chain extensions for further applications in Material Science.
- Developed an advanced VEMA-lipid nanodiscs based system to determine membrane proteins properties in native like environments.
- Developed VEMA Block Butyl Acrylate polymers to investigate Lipid nano-discs systems if tail hydrophobicity is controlled.
- Developed derivatized VEMA copolymers with using nucleophiles to study the effect of charges on lipid nano discs.
- Added Spin label on VEMA Polymer to study insights of Polymer lipid nanodiscs.
- Explored drinking water treatment based on amphibolic copolymers

### MUNIR LAB | RESEARCH ASSISTANT

2015 – 2017 | GCUF Faisalabad, Pakistan

- Determined the persistence of a mixture of organic dyes (Reactive Orange 12 and Reactive Red 24) in used in textile industry.
- Discovered the degradation of organic dyes (Reactive Orange 12 and Reactive Red 24) using gamma radiation in aqueous medium.

## SELECTED PUBLICATIONS

- 1) Shah, M. Z.; Rotich, N. C.; Okorafor, E. A.; Oestreicher, Z.; Demidovich, G.; Eapen, J.; Henoch, Q.; Kilbey, J.; Prempeh, G.; Bates, A.; Page, R. C.; Lorigan, G. A.; Konkolewicz, D. Vinyl Ether Maleic Acid Polymers: Tunable Polymers for Self-Assembled Lipid Nanodiscs and Environments for Membrane Proteins. Biomacromolecules 2024. <https://doi.org/10.1021/acs.biomac.4c00772>.
- 2) Shah, M. Z.; Rotich, N. C.; Okorafor, E. A.; Henoch, Q.; Page, R. C.; Lorigan, G. A.; Konkolewicz, D. VEMA Block Copolymers: A Versatile Platform for Tunable Self-Assembled Lipid Nanodiscs and Membrane Protein Characterization (2025). Polymer chemistry RSC, Awaiting publication.
- 3) Okorafor, E. A., Gordon, E. A., Sahu, I. D., Shah, M. Z., Konkolewicz, D., & Lorigan, G. (2025). Influence of lipid saturation on the structural properties of styrene maleic acid lipid nanoparticles (SMALPs). Biochimica et Biophysica Acta (BBA)-Biomembranes, 184424.

## TEACHING AND MANAGEMENT EXPERIENCE

### Research Assistantship Miami University

- Mentored 11 undergraduates and published research papers in the area of polymer and lipid systems (Fall 2023- Continued).

### Teaching Assistantship Miami University

- General Chemistry (Spring'21 to Spring'22) CHM144 CHM145
- Organic Chemistry (Fall'22 to Spring'23) CHM244 CHM245

### Management and Teaching Experience under Punjab Government

- Assistant Education Officer in Punjab Schools Education Department (2017-2020)
- Science Teacher in Public School (2016-2017)
- Lecturer Internship in Degree College Jhumar Punjab (2015-2016)

## **LANGUAGES**

Urdu • Hindi • English • Punjabi

• Saraiki • Arabic

## **REFERENCES**

Available on request

## **POSTER AND ORAL PRESENTATIONS**

### **| POSTER PRESENTATION**

- Poster Presentation on Vinyl Ethers- Maleic anhydride Lipid nano discs in ACS Fall 2025 PMSE section Conference Washington DC (August 2025)
- Poster Presentation on Vinyl Ethers- Maleic anhydride Lipid nano discs in ACS Fall 2025 POLY Section Conference Washington DC (August 2025)
- Poster Presentation at SMALPs conference 2023 in University of Tennessee, (Nov 23, 2023)

### **| ORAL PRESENTATION**

- Presentation on Polymer systems for studying membrane proteins in International Conference on Functional Materials and Emerging Technologies at Agriculture University of Faisalabad Pakistan, (Nov-2024)
- Presentation on Polymer based Lipid nano discs at Graduate Research Forum 2024 at Miami University, (Nov-2024)
- Presentation on Vinyl Ethers- Maleic anhydride Lipid nano discs in ACS Chapter of SW OH (Oct-2024)
- Presentation on Vinyl Ethers- Maleic anhydride Lipid nano discs in SMALPs conference 2023 at University of Tennessee, (Nov 24, 2023)
- Flash Talk – Poly/PMSE Chapter ACS at the University of Cincinnati (July 7th, 2023)
- Presentation on Lipid discs formation for studying membrane proteins in ACS Spring 2023 Conference Indianapolis (March 2023)
- Presentation on Kinetic study of butyl vinyl ether and maleic anhydride copolymerization in ACS Spring 2023 Conference Indianapolis (March 2023)

## **AWARDS AND EXTRACURRICULARS**

- Served as Judge for posters relevant to PMSE ACS Fall 2025 Conference Washington DC (Fall 2025)
- Decorated PMSE desk for ACS Fall 2025 Conference Washington DC (Fall 2025)
- Recipient of Graduate Travel Fund to attend the ACS Fall 2025 Conference Washington DC (Fall 2025)
- President in Poly/PMSE chapter Cincinnati Division in Ohio of American Chemical Society (2024-continue)
- Best presenter recognition at ACS Chapter of SW OH (Oct-2024)
- Working on research project funded by National Institute of Health USA in Dr. Konkolewicz lab (Since 2022)
- Treasurer in Poly/PMSE chapter Cincinnati Division in Ohio of American Chemical Society (2022-2023)
- Recipient of Graduate Research Fellowship (May'23)
- Recipient of Graduate Travel Fund to attend the ACS Spring 2023 Conference Indianapolis (March 2023)
- Recipient of Graduate Travel Fund to attend the SMALPs 2023 Conference Knoxville, Tennessee (Nov 2023)
- Volunteering as reviewer for Journal on Excellence in College Teaching. (Since 2023)
- Recipient of Graduate Research Fellowship (May'22)
- Approved for National Interest Waiver (NIW) EB2 by USCIS (Priority date Feb 2025)