

RYAN M^cDONNELL

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EDUCATION

Ph.D. Student, Physical Chemistry
University of Wisconsin - Madison, Madison, WI

August 2021 - Present

B.S., Chemistry
ACS Certified; *Distinction in Major*
Temple University, Philadelphia, PA
Research Advisor: Dr. Eric Borguet

May 2021

RESEARCH EXPERIENCE

Undergraduate Research Assistant
Borguet Group, Temple University

January 2019 – July 2021

Project: Spectroscopic Study of Molecular Interactions with UiO Metal Organic Frameworks (MOFs)

Primary Project: Identification of defect sites in UiO-67 metal organic frameworks

- Investigation of UiO-67 MOFs capability to capture toxic industrial chemicals via *in-situ* infrared spectroscopy (FT-IR); temperature programmed desorption mass spectrometry (TPD-MS) under Ultra High Vacuum (UHV)
- *in-situ* FT-IR investigation of induced and synthetic defects in UiO-67 MOFs through adsorption of ammonia, acetonitrile, chloroform

Secondary Project: Transport of Molecular Probes through UiO-66/67 MOFs

- Molecular transport mechanisms of acetone, iPrOH, CD₃CN, H₂O through UiO-66 and UiO-67 MOFs elucidated with isothermal diffusion technique, probed via *in-situ* FT-IR
- Development of diffusion models to understand simultaneous analyte diffusion inward and outward of UiO-66 and UiO-67 MOFs as probed via FT-IR.

Undergraduate Research Assistant
NSF Emerging STEM Scholars, Temple University

September 2020 – June 2021

Project: Analyzing the effect of the COVID-19 Pandemic on Student Life

- Quantitative and Qualitative Analysis of STEM Student Experiences during the Fall 2020 Semester
- Determining common themes present in daily lives of STEM students directly connected to the COVID-19 pandemic.

PUBLICATIONS

1. Identifying UiO-67 Metal Organic Framework Defects and Binding Sites through Ammonia Adsorption
Devulapalli, V.S.D.[†], **McDonnell, R.**,[†] Ruffley, J.P., Shukla, P.B., Luo, T-Y., De Souza, M., Das, P., Rosi, N.L., Johnson, J.K., Borguet, E.
Submitted.
2. The Evolution and Infrared Characterization of Thermally Induced Defects in UiO-67 Metal Organic Frameworks
McDonnell, R.,[†] Devulapalli, V.S.D.[†], McDonnell, L.[†], Goodenough, I., De Souza, M., Das, P., Rosi, N.L., Borguet, E. Manuscript in Preparation.
3. The Effect of the COVID-19 Pandemic on STEM Students
McDonnell, R., *et al.* Manuscript in Preparation.

POSTER PRESENTATIONS

1. Impact of Thermal Treatment on Metal Organic Frameworks (MOFs) and their Sorption Capacity: A Temperature Programmed Ultra-High Vacuum Study.
McDonnell, R., Devulapalli, V.S.D., Boyanich, M.C., Goodenough, I., Castellana, L., Luo, T-Y., Rosi, N.L., Borguet, E.
7th Philadelphia Inorganic Colloquium, Philadelphia, PA, May 11, 2019
2. Interactions between Toxic Industrial Chemicals (TICs) and functionalized Zirconium UiO-67 Metal Organic Frameworks (MOFs).
McDonnell, R., Devulapalli, V.S.D., Goodenough, I., Luo, T-Y., Rosi, N.L., Borguet, E.
Temple University CST Undergraduate Research Symposium, Philadelphia, PA, September 27, 2019
3. Interactions between Industrial Chemicals and functionalized Zirconium Based Metal Organic Frameworks (MOFs).
McDonnell, R., Devulapalli, V.S.D., Goodenough, I., Luo, T-Y., Rosi, N.L., Borguet, E.
8th Philadelphia Inorganic Colloquium, Philadelphia, PA, November 9, 2019
4. Interaction of Metal Organic Frameworks with Organic Solvents.*
McDonnell, R., Devulapalli, V.S.D., Goodenough, I., Luo, T-Y., Rosi, N.L., Borguet, E.
19th Annual Philadelphia ACS Young Chemists Conference, Philadelphia, PA, January 22, 2020
***(Received Second Best Poster Award)**
5. Probing the Acidity and Basicity of Thermally Activated Zirconium Metal-Organic Frameworks.
McDonnell, R., Devulapalli, V.S.D., De Souza, M., Luo, T-Y., Rosi, N.L., Borguet, E.
1st Eastern Analytical Symposium September Virtual Student Symposium, September 14, 2020
6. The Lewis Acidity and Basicity of Thermally Activated UiO-67 Metal Organic Frameworks.
McDonnell, R., Devulapalli, V.S.D., De Souza, M., Luo, T-Y., Rosi, N.L., Borguet, E.
Thermal Analysis Forum of Delaware Valley, December 15, 2020
7. Probing H₂O Terminated Defects in UiO-67 Metal Organic Frameworks through Ammonia Adsorption.*
McDonnell, R., Devulapalli, V.S.D., Ruffley, J.P., Luo, T-Y., De Souza, M., Das, P., Rosi, N.L., Johnson, J.K., Borguet, E.
2021 ACS Eastern US YCC Partnership Research Symposium, August 3, 2021
***(Received Best Poster Award)**

ORAL PRESENTATIONS

1. Probing UiO-67 Metal Organic Framework Defects Through the Diffusion of Acetonitrile.
McDonnell, R., Devulapalli, V.S.D., Goodenough, I., Das, P., Rosi, N.L., Borguet, E.
ACS Spring 2021 National Meeting, April 5, 2021.
2. Elucidating Ammonia Interactions with UiO-67 Metal Organic Frameworks.
McDonnell, R., Devulapalli, V.S.D., Ruffley, J.P., Luo, T-Y., De Souza, M., Rosi, N.L., Johnson, J.K., Borguet, E.
Temple University Undergraduate Research Symposium, April 14, 2021.

OUTREACH

Title: Advocating for Underrepresented Groups in STEM Communities at Temple University

Personnel: Ryan McDonnell, Binh-An T. Nguyen, Jordan Wenning, Dr. Eric Borguet

Objective: Hold seminars to inspire members of the Temple STEM community to help retain underrepresented groups in STEM.

Funding Source: DEI Committee, College of Science and Technology, Temple University.

Amount: \$ 2500.00

Award Period: 01/01/2021 - 12/31/2021

TECHNICAL SKILLS

- Scientific Software: IGOR, LabVIEW, OPUS, Andor Solis, Mathematica, ChemDraw, LaTeX
- Ultra High Vacuum (UHV): Chamber Design, Use, Maintenance
- Instrumentation:
 - FT-IR Spectrometer (Bruker Tensor 27)
 - RGA-MS (Stanford Research Systems RGA 300)
 - UV/Vis/NIR (JASCO V530 Spectrophotometer)
- Simple Optics and Laser Assembly
- FT-IR, TPD-MS Spectral Analyses
- Linux: especially OpenSUSE and Ubuntu

PROFESSIONAL ACTIVITIES

- Member of American Chemical Society (ACS) 2018 - Present
- Member of Electrochemical Society (ECS) 2020 - Present

HONORS

- Temple University Department of Chemistry Service Award Spring 2021
- NSF Emerging STEM Scholar Fall 2018 – Summer 2021
- Emerging STEM Scholars Research Stipend Recipient Summer 2020, Summer 2021
- Undergraduate Research Program, Temple University Summer 2019, Fall 2020
- Eagle Scout