# Emil I. Jaffal

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## Education

**City University of New York**, The Graduate Center — Expected 2028
*Ph.D., Chemistry*
Advisor: Dr. Anton Oliynyk

**Fordham University**, Fordham College at Rose Hill — Aug 2019 – May 2023
*B.Sc., Chemistry*

## Research experience

**Ph.D. Student** — *New York, NY*
*City University of New York, Hunter College* — Jul 2024 – Present

**Solid-State Chemistry Laboratory, Dr. Anton Oliynyk**

- Conducting exploratory syntheses of novel intermetallic materials with corresponding analyses using powder X-ray diffraction and scanning electron microscopy.
- Enhancing machine learning applications to predict properties of various binary and ternary compounds, focusing on improving interpretability and predictive capabilities of models in solid-state materials by incorporating detailed structural information.
- Mentoring a handful of students in the lab, providing guidance in research projects and experimental/computational techniques.

**Undergraduate Researcher** — *Bronx, NY*
*Fordham University* — Sep 2021 – May 2023

**Organic/Materials Chemistry Laboratory, Dr. Julia Schneider**

- Steered materials research involving various reactions as part of a novel multi-step synthesis to create organic semiconductors (OSCs) with tunable conjugated heterocycles to improve conductivity.
- Instrumentation experience includes handling UV-Vis, NMR, fluorescence, and IR spectroscopy with respective machinery and analytic interpretations. General synthesis and purification skills include distillations, extractions, filtrations, and recrystallizations.

**Computational Chemistry Laboratory, Dr. Joshua Schrier**

- Identified probable transition states of novel syntheses as part of a collaboration within the chemistry department.
- Performed numerous Gaussian ab initio calculations of internal energies, electronic structures, and geometric data using density functional theory to analyze reaction thermodynamics and predict isomer formations of OSCs.

## Professional experience

**Research chemist** — *Tarrytown, NY*
*ICL Industrial Products* — Sep 2023 – Jul 2024

- Synthetic expertise includes developing various novel flame retardant blends for polyurethane foams with external manufacturers and customer additives while ensuring compliance with international safety regulations.
- Pioneered the integration of polyurethane for battery encapsulation, contributing to cutting-edge advancements in environmentally conscious and technologically innovative materials, leading to a

patent application.

- Executed laboratory experiments aligning with market support and new product development objectives.
- Conducted standardized flammability and physical property tests to assess the performance of various halogenated and nonhalogenated flame retardant products.

## Publications

**Composition and Structure Analyzer/Featurizer for Explainable ML Models to Predict Solid State Structures**. Digital Discovery. *Accepted*. DOI: 10.26434/chemrxiv-2024-rrbhc — Oct 2024

**Jaffal E.I.**, Shiryaev D., Vtorov A., Lee S., Barua N.K. & Oliynyk A.O.

**Synthesis of Pyrene Diimide Isomers with Tunable Excimer Formation**. Organic Letters. DOI: 10.1021/acs.orglett.4c03523 — Jan 2025

Johnston K., McCostis A., Mikita E., **Jaffal E.** & Schneider J.A.

## Presentations

**Brookhaven Nat'l Lab Nuclear Chem Summer School** – *New York, NY* — Jul 2024

The Oliynyk Lab

**Materials Research Society Meeting and Exhibit** – *Boston, MA* — Nov 2023

Effect of Backbone Linearity on Mixed-Conductance in New Pyrene Dianhydride-Based Conjugated Ladder Polymers

**Fordham University Jean Dreyfus Lectureship** – *Bronx, NY* — Apr 2023

The Schneider Lab

**MAPS: Research at Fordham** – *Bronx, NY* — Nov 2022

Vinyl Azide Cyclization: Where Organic and Computational Chemistry Meet

## Posters

**Gordon Research Conference** – *Newry, ME* — Jul 2024

Materials Informatics: Binary/Ternary Composition and Structure Featurizer for ML Models

## Projects

**Composition Analyzer/Featurizer (CAF)** — Jun 2024

Developed an interactive Python script that generates chemical compositional features and provides tools for filtering, sorting, and merging data. Aids novice solid-state chemists and materials scientists in generating compositional training data ranging from dozens to tens of thousands of compounds.

## Patents

**Heat Resistant Semi-Rigid Polyurethane Foams**. *Provisional patent #63/680,764*. — Aug 2024

**Emil Jaffal**, Sergei Levchik, Zhihao Chen, Jeffrey Stowell & Munjal Patel.

## Honors and Grants

CUNY Certificate of Achievement — 2025

*Recognized for outstanding success as a first year graduate student and submitting my first publication during the Fall 2024 semester.*

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| CUNY Science Scholarship | 2024 |
| Fordham University Dean's List | 2023 |
| NSF Summer Research Funding Grant (DMR-1928882) | 2022 |

## Service

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| Fordham University Muslim Students Association – *Treasurer* | Sep 2022 – May 2023 |
| Fordham University Arabic Club – *Vice President* | Jan 2022 – Aug 2022 |
| Fordham Undergraduate Research Journal – *Peer Editor* | Sep 2022 – May 2023 |

## Memberships

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| Sigma Xi, The Scientific Research Honor Society – *Associate Member* | Mar 2023 – Present |

## Technical skills

**Software:** Bluehill, ChemOffice, Gaussian16, Mathematica, Maestro, Microsoft Office, Signals Notebook, TopSpin, VASP, WebMO.
**Programming languages:** Python, Bash, Wolfram.
**Packages:** NumPy, SciPy, Scikit-Learn, Pandas, Matplotlib.
**Languages:** Arabic (native), English (native), Spanish (conversational).