

# Joseph Maalouf

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## EDUCATION:

**MIT:** PhD Candidate in Chemical Engineering

**Advisor:** Karthish Manthiram

**Stanford University:** BS in Chemical Engineering with Honors and Academic Distinction, Class of 2017

GPA: 4.00/4.3

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## EXPERIENCE:

**Electrochemical Lactone Formation from Ketones using Water as an Oxygen Atom Source (Manthiram Group):** June 2019-Present

Used Platinum based materials to electrochemically transform cyclic ketone substrates into their corresponding lactone products. Water was used as an oxygen atom source with Faradaic efficiencies of approximately 20% and current densities over 25 mA.

**Metal Oxide Materials as Electrochemical Olefin Epoxidation Catalysts (Manthiram Group):** January 2018-January 2019

Worked to synthesize various metal oxide nanoparticles and electrodeposited thin film metal oxides that were used as electrochemical olefin catalysts. Specifically, H<sub>2</sub>O was used as an oxygen source in a predominantly non aqueous solvent to perform an electrochemical oxygen transfer reaction reaching faradaic efficiencies of over 40% for the conversion of an olefin to its corresponding epoxide.

**Teaching Assistant for *Introduction to Chemical Engineering (ChemEng 20)* at Stanford University:** April 2017-June 2017

Duties included leading a weekly discussion section and office hours for students along with aiding to design exam questions. The course covers introductory topics in chemical engineering including mass and energy balances, along with basic reactor design.

**Heterobimetallic Complexes as Controlled Precursors for Methane Oxidation (Cargnello Group), Stanford University:** June 2015-June 2017

Worked to synthesize highly controlled and ordered systems for heterogeneous catalysts. Specifically, I synthesized novel bimetallic precursors to be used in the creation of single site, promoted catalysts. These catalysts were to be used for important chemical transformations such as methane oxidation and carbon dioxide reduction.

**Ni:Co Bimetallic Nanoparticles as Active and Stable Dry Reforming Catalysts (Cargnello Group), Stanford University :** December 2016-June 2017

Used traditional colloidal synthetic techniques to develop Nickel:Cobalt bimetallic nanoparticles that were then deposited onto a thermally stable support (Al<sub>2</sub>O<sub>3</sub>) and tested for their activity and stability in the dry reforming of methane using a packed bed reactor.

**Vice Provost for Undergraduate Education (VPUE) Grant** (Summer 2015)

Those selected by the Chemical Engineering department were rewarded \$6400 to fund summer research.

**Summer Undergraduate Program on Energy Research Grant** (Summer 2016)

Students were selected by the Stanford University Precourt Institute for Energy to work on novel and individualized energy research during the summer of 2016. Grant recipients received a \$6,400 to fund their research.

**Math and Physics Tutor:** Center for Teaching and Learning, Stanford University, September 2015- Present

Drop-in style tutoring environment through Stanford University for 4 hours a week. Specific subjects tutored include single and multivariable calculus, differential equations (ode's and pde's), mechanics, E&M, thermodynamics, and optics.

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## **AWARDS AND ACHIEVEMENTS:**

### **Dow Travel Grant (2020)**

Awarded \$1000 to travel to present my work on electrochemical lactonization at the Electrochemical Society's Pacific Rim meeting on solid-state science (PRiME) 2020 conference.

### **Paul & Daisy Soros Fellow (2019)**

Two year fellowship that is awarded to immigrants or the children of immigrants who have demonstrated a drive to use their skills to make significant contributions to US society.

### **Alfred P. Sloan Foundation UCEM Scholarship (2017)**

Scholarship rewarded to a small number of incoming MIT students to aid their professional development.

### **Mason-Marsden Prize (Stanford University, 2017)**

Awarded to student for outstanding research throughout their undergraduate career.

### **National Science Foundation Graduate Research Fellowship (2017)**

Fellowship provided by the National Science Foundation over 5 years to fund research and living expenses.

### **Fredrick Emmons Terman Engineering Scholastic Award (Stanford University, 2017 )**

Awarded to the top 5% of each year's undergraduate senior engineering class by GPA.

### **President's Award for Academic Excellence in the Freshman Year (Stanford University, 2013)**

Awarded to top 3% of freshmen class by GPA.

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## **PUBLICATIONS:**

Park, J., Jin, K., Sahsrabudhe, A., Chiang, P., **Maalouf, J. H.**, Rai, S., ... Anikeeva, P.(2019) In situ Electrochemical Generation of Nitric Oxide for Spatiotemporally Precise Neuronal Modulation. *Nat. Nanotechnology*. **2020**

**Maalouf, J. H.**; Jin, K.; Yang, D.; Limaye, A. M.; Manthiram, K. Kinetic Analysis of Electrochemical Lactonization of Ketones Using Water as the Oxygen Atom Source. *ACS Catal.* **2020**, *10*, 5750–5756.

Jin, K.; **Maalouf, J.**; Lazouski, N.; Corbin, N.; Yang, D.; Manthiram, K. Epoxidation of Cyclooctene Using Water as the Oxygen Atom Source at Manganese Oxide Electrocatalysts. *J. Am. Chem. Soc.* **2019**, *141*, 6413–6418.

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## **ACTIVITIES AND SOCIETIES:**

### **Diversity and Inclusion in Chemical Engineering (2020-present)**

Founded a student led group within MIT's chemical engineering department focused on fostering diversity, equity, and inclusion.

### **Tau Beta Pi: Social Advisor (Winter 2016-present)**

National Engineering Society, admission given to top 12.5% of juniors in engineering by GPA. Duties as social adviser include organizing events to strengthen Stanford's TBP community as well as events such to introduce scientific concepts to young children.

### **Stanford Club Tennis: Financial Officer (2014-2016)**

Duties include raising funds and reimbursing club members. Secured over \$15,000 in funds from a variety of sources and also coordinated club members with fundraising events.

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#### **ACADEMIC PRESENTATIONS:**

**Title:** Heterobimetallic Complexes as Controlled Precursors for Atomically Dispersed, Promoted Methane Oxidation Catalysts

**Event:** American Institute of Chemical Engineers National Convention 2016

**Description:** I gave a twenty minute oral presentation at the "Atomically Dispersed Metal Catalysts" symposium on November 17th 2016.

**Title:** Heterobimetallic Complexes as Controlled Precursors for Methane and Carbon Dioxide Activation Catalysts

**Event:** Stanford University Symposium for Undergraduate Research and Public Service

**Description:** I presented a poster of the work I performed over the summer of 2016. The presentation occurred on October 20<sup>th</sup> 2016.

**Title:** Heterobimetallic Complexes as Single Site, Promoted Methane Oxidation Catalysts

**Event:** Stanford University Chemical Engineering REU Symposium

**Description:** I presented a poster of the work I performed over the summer of 2015. The presentation occurred on September 22<sup>nd</sup> 2015.