

# S. Hessam M. Mehr

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Department of Chemistry  
University of Glasgow  
University Avenue  
Glasgow, UK G12 8QQ

+44 (756) 897-7309  
<https://hessammehr.github.io>  
<http://www.chem.gla.ac.uk/cronin/members/Hessam/hessammehr@gmail.com>

## AREAS OF RESEARCH INTEREST

Staged programming, compilation and reasoning on domain-specific knowledge  
Closed-loop chemical discovery using novel software and automation techniques  
Logic/probabilistic programming in the large

## EMPLOYMENT

**Post-doctoral research assistant** Cronin Lab, *University of Glasgow*, Glasgow, UK 2018–  
Developed probabilistic models for discovering new chemicals and chemical reactions; helped develop abstractions and software for universal automation of chemical synthesis  
**Researcher** Drug Analysis Service, *Health Canada*, Burnaby, Canada 2017–2018  
Designed and implemented a high-performance algorithm for automatic identification and quantitation of drug molecules using NMR spectroscopy

## EDUCATION

**Doctor of Philosophy** Chemistry, *University of British Columbia (UBC)*, Vancouver, Canada 2011–2017  
Created materials with new and unusual properties by harnessing tautomerism and electron delocalization  
*Supervisor: Prof. Mark MacLachlan*  
**Bachelor of Science** Electrical Engineering, *Sharif University of Technology*, Tehran, Iran 2005–2009  
Used finite-difference time-domain methods to study light propagation in finite-sized photonic crystals  
*Supervisor: Prof. Khashayar Mehrany*

## PUBLICATIONS

### A universal approach to the digitization and automatic execution of the chemical synthesis literature

Mehr, S. H. M.; Craven, M.; Leonov, A. I.; Keenan, G.; Cronin, L.  
*Nature*, 2020 (*under review*)

### Intuition-Enabled Machine Learning Beats the Competition When Joint Human-Robot Teams Perform Inorganic Chemical Experiments

Duros, V.; Grizou, J.; Sharma, A.; Mehr, S. H. M.; Bubliauskas, A.; Frei, P.; Miras, H. N.; Cronin, L.  
*J. Chem. Inf. Model.*, 2019 (DOI: [10.1021/acs.jcim.9b00304](https://doi.org/10.1021/acs.jcim.9b00304))

### Catalyst: The Metaphysics of Chemical Reactivity

Cronin, L.; Mehr, S. H. M.; Granda, J. M.  
*Chem*, 2018, 4 (8), 1759–1761 (DOI: [10.1016/j.chempr.2018.07.008](https://doi.org/10.1016/j.chempr.2018.07.008))

### Controlling Ligand Exchange through Macrocyclization

Carta, V.; Mehr, S. H. M.; MacLachlan, M. J.  
*Inorganic chemistry*, 2018, 57 (6) 3243–3253 (DOI: [10.1021/acs.inorgchem.8b00031](https://doi.org/10.1021/acs.inorgchem.8b00031))

### Turing the tautomeric behaviour of tris(salicylaldimines)

Mehr, S. H. M.; Oshima, H.; Carta, V.; Patrick, B. O.; White, N. G.; MacLachlan, M. J.  
*Org. Biomol. Chem.*, 2018, 15 (39), 3243–3253 (DOI: [10.1039/C7OB02058A](https://doi.org/10.1039/C7OB02058A))

### Formylation of phenols using formamidine acetate

Mehr, S. H. M.; Depmeier, H.; Fukuyama, K.; Maghami, M.; MacLachlan, M. J.  
*Org. Biomol. Chem.*, 2017, 15 (3), 581–583 (DOI: [10.1039/C6OB02727J](https://doi.org/10.1039/C6OB02727J))

### **Stabilization of a Strained Heteroradialene by Peripheral Electron Delocalization**

Mehr, S. H. M.; Patrick, B. O.; MacLachlan, M. J.  
*Org. Lett.*, **2016**, 18 (8), 1840–1843 (DOI: [10.1021/acs.orglett.6b00577](https://doi.org/10.1021/acs.orglett.6b00577))

### **Deuteration of Aromatic Rings Under Very Mild Conditions Through Keto-Enamine Tautomeric Amplification**

Mehr, S. H. M.; Fukuyama, K.; Bishop, S.; Lelj, F.; MacLachlan, M. J.  
*J. Org. Chem.*, **2015**, 80 (10), 5144–5150 (DOI: [10.1021/acs.joc.5b00539](https://doi.org/10.1021/acs.joc.5b00539))

### **Novel PPV/Mesoporous Organosilica Composites: Influence of the Host Chirality on a Conjugated Polymer Guest**

Mehr, S. H. M.; Giese, M.; Qi, H.; Shopsowitz, K.; Hamad, W. Y.; MacLachlan, M. J.  
*Langmuir*, **2013**, 29 (40), 12579–12584 (DOI: [10.1021/la4024597](https://doi.org/10.1021/la4024597))

### **Role of Entropy and Autosolvation in Dimerization and Complexation of C<sub>60</sub> by Zn<sub>7</sub> Metallocavitands**

Frischmann, P.D.; Mehr, S. H. M.; Patrick, B. O.; Lelj, F.; MacLachlan, M. J.  
*Inorg. Chem.*, **2012**, 51 (6), 3443–3453 (DOI: [10.1021/ic202049t](https://doi.org/10.1021/ic202049t))

### **Influence of asymmetry on the band structure of photonic crystals**

Mehr, S. H. M.; Khorasani, S.  
in *OPTO*, International Society For Optics And Photonics, **2010**, 76091–76091 (DOI: [10.1117/12.839839](https://doi.org/10.1117/12.839839))

## **TALKS AND POSTER PRESENTATIONS**

### **Saving Lives with Julia**

JuliaCon 2018, London, UK

### **Badass Bonding — Unsettled Electrons in Shape-Shifting Molecules**

Inorganic Discussion Group, Department of Chemistry, 2016, UBC, Vancouver

### **A Switch in Character: Deriving Novel Reactivity from Tautomerism**

ISMSC 2015: 10th International Symposium on Macrocyclic and Supramolecular Chemistry, 2015, Strasbourg

### **Kinetics by NMR: A Live Demonstration**

8th Annual VIVA NMR Symposium, August, 2014, Vancouver

### **Using Tautomers for Gentle Deuteration of Benzene Rings**

97th Canadian Chemistry Conference and Exhibition, June, 2014, Vancouver

### **Macrocycles as Functional Materials**

Canada-Japan Joint Symposium on Supramolecular Nanomaterials Science, May, 2012, Whistler

## **AWARDS & HONOURS**

**International Tuition Award** UBC, 2011–2017

**ISMSC Scholarship** Competitive award for abstracts at the 10th International Symposium on Macrocyclic and Supramolecular Chemistry, Strasbourg, 2015

**Arnold By Travel Award** UBC, 2015

**Graduate Student Travel Award** UBC, 2015

**Faculty of Science Graduate Award** UBC, 2016–2017

**Faculty of Science PhD Tuition Award** UBC, 2016–2017

## **LEADERSHIP & SERVICE**

**Vice president** Chemistry Graduate Student Society (CGSS), UBC, 2013–2014

**Presenter/facilitator** *Chemistry Field Trips* for high school students, UBC, 2012–2016

**Presenter/facilitator** *Chemistry Beyond the Magic* open house, UBC, 2011–2015

## TEACHING EXPERIENCE

**Shared Instrument Facility (TA)** University of British Columbia (UBC), 2012–2016

**Organic Chemistry** Farzanegan High School, 2005–2010

**Digital Signal Processing Lab (TA)** Sharif Univ. Tech., 2009–2010

**Chemistry for the International Chemistry Olympiad** Allameh Helli High School, Tehran, Iran, 2004–2010

## STUDENTS SUPERVISED

**Hannah Depmeier** Devising methods towards multiple-formylation of phenols 2016 (BSc)

**Mahboobeh Maghami** Tautomerism in Schiff base macrocycles 2014–2015 (PhD)

**Stephanie Bishop** Facile H/D exchange in salicylideneamine derivatives 2013–2014 (BSc)

**Marcus Farnfield** Salicylaldimines as photodegradable crosslinkers 2013–2014 (BSc)

**Jason Yang** Molecular capsules based on salicylaldimines 2013–2014 (BSc)

## SOFTWARE

**Programming** Julia, Prolog, Python, Clojure, OCaml, C, Rust, JavaScript,  $\LaTeX$  ([github.com/hessammehr](https://github.com/hessammehr))

## LANGUAGES

**English, Farsi** Native

**French, Italian** Fair