

# Christine Cheng

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## Education

- University of Southern California**, Los Angeles, CA **Aug 2015-Current**  
Ph.D. Student, Chemical Engineering (GPA: 4.0)
- California Institute of Technology**, Pasadena, CA **Sep 2010-June 2014**  
B.S., Chemical Engineering (Materials), English (minor) (GPA: 3.3)
- Santa Clara University**, Santa Clara, CA **July-Sept 2014**  
Visiting Student, Computer Science (GPA: 4.0)
- Stanford University**, Stanford, CA **Sept-Dec 2014**  
Visiting Student, Aeronautics and Astronautics (GPA: 3.7)

## Work Experience

- Prof. Malancha Gupta Research Group**, University of Southern California  
*Chemical Engineering Ph.D. Student* **Aug 2015-Current**
- Used initiated chemical vapor deposition (iCVD) to synthesize polymer thin film coatings on substrates
  - Developed and optimized a novel technique for grafting (covalently attaching) hydrophilic and responsive polymer coatings onto hydrophobic substrates by using an oxygen plasma to generate surface free radicals, with applications for improved coatings of implantable medical devices
  - 3D printed substrates with complex morphologies in order to graft polymer coatings via iCVD
  - Characterized coatings using contact angle goniometry and X-ray photoelectron spectroscopy
- Northrop Grumman Corporation**, Space Systems Technology, Manhattan Beach, CA  
*Microelectronics and Semiconductors Engineer* **Jan-Aug 2015**
- Supported metal evaporation process in the foundry, developed novel processes for evaporation of metals requiring high evaporation power
  - Optimized Au evaporation processes by working on evaporation mask development, thus doubling throughput and reducing Au usage (\$1.5M/yr)
- Prof. Robert H. Grubbs Research Group**, California Institute of Technology  
*Roman Armaan Mack Summer Undergraduate Research Fellow* **June 2013-June 2014**
- Utilized bio-inspired functional groups to overcome limitations of traditional synthetic adhesives
  - Explored and optimized novel polymer adhesive systems with reversible adhesion properties
- California Institute of Technology**, working with Dr. Jeffrey Mendez  
*Howard Hughes Medical Institute Teaching Fellow* **Apr-June 2014**  
*California Institute of Technology Undergraduate Teaching Fellow* **Apr-June 2013**
- Chemical Synthesis and Characterization: prepared and evaluated undergraduate laboratory sections
- Prof. Theodor Agapie Research Group**, California Institute of Technology  
*Sidney R. and Nancy M. Petersen Summer Undergraduate Research Fellow* **Mar-Nov 2012**
- Investigated reactivity of molybdenum complexes supported by a terphenyl diphosphine pincer ligand
  - Explored coordination chemistry of Mo complexes and different molybdenum-arene binding modes
- Edward W. Hughes Summer Undergraduate Research Fellow* **Mar-Aug 2011**
- Designed and synthesized nickel complexes of redox-active protic ligands for CO<sub>2</sub> reduction

## Peer-Reviewed Publication

Buss, J.A.; Edouard, G.A.; **Cheng, C.**; Shi, J.; Agapie, T. "Molybdenum Catalyzed Ammonia Borane Dehydrogenation: Oxidation State Specific Mechanisms." *J. Am. Chem. Soc.*, **2014**, 136, 11272-11275.

*Abstract: Though numerous catalysts for the dehydrogenation of ammonia borane (AB) are known, those that release >2 equiv of H<sub>2</sub> are uncommon. Herein, we report the synthesis of Mo complexes supported by a para-terphenyl diphosphine ligand displaying metal-arene interactions. Both a Mo<sup>0</sup> N<sub>2</sub> complex and a Mo<sup>II</sup> bis(acetonitrile) complex exhibit high levels of AB dehydrogenation, releasing over 2.0 equiv of H<sub>2</sub>. The reaction rate, extent of dehydrogenation, and reaction mechanism vary as a function of the precatalyst oxidation state. Several Mo hydrides (Mo<sup>II</sup>(H)<sub>2</sub>, [Mo(H)]<sup>+</sup>, and [Mo<sup>IV</sup>(H)<sub>3</sub>]<sup>+</sup>) relevant to AB chemistry were characterized.*

## Fellowships and Awards

2014: Howard Hughes Medical Institute Undergraduate Teaching Fellowship

2013: Ronan Armaan Mack Summer Undergraduate Research Fellowship

2013: California Institute of Technology Undergraduate Teaching Fellowship

2012: Sidney R. and Nancy M. Petersen Summer Undergraduate Research Fellowship

2012: Kanel Foundation Scholarship

2011: Edward W. Hughes Summer Undergraduate Research Fellowship

## Conference and Seminar Presentations

- **Cheng, C.** and Grubbs, R.H. "Bio-inspired Adhesive Polymers: Enhancing Tackiness and Wet Adhesion Using Rosin and DOPA." *Summer Undergraduate Research Fellowship Summer Seminar Day, California Institute of Technology, Pasadena, CA, Aug 2013.*
- **Cheng, C.** and Agapie, T. "Molybdenum Complexes Supported by a Terphenyl Diphosphine Pincer Ligand for the Activation of Small Molecules." *American Chemical Society Undergraduate Research Conference in Chemistry and Biochemistry, Claremont, CA, Apr 2013.*
- **Cheng, C.** and Agapie, T. "Molybdenum Complexes Supported by a Terphenyl Diphosphine Pincer Ligand." *Southern California Conferences for Undergraduate Research, Camarillo, CA, Nov 2013.*
- **Cheng, C.** and Agapie, T. "Molybdenum Complexes Supported by a Terphenyl Diphosphine Pincer Ligand." *Summer Undergraduate Research Fellowship Fall Seminar Day, California Institute of Technology, Pasadena, CA, Oct 2012.*
- **Cheng, C.** and Agapie, T. "Nickel Complexes of Redox-Active Protic Ligands for CO<sub>2</sub> Reduction." *Summer Undergraduate Research Fellowship Summer Seminar Day, California Institute of Technology, Pasadena, CA, Aug 2011.*

## Skills

- Strong collaboration and teamwork abilities, dexterity in learning new fields
- Proficient with air-sensitive techniques such as Schlenk, Cannula, and glovebox techniques
- Experienced with <sup>1</sup>H, <sup>13</sup>C, <sup>31</sup>P NMR, XPS, FTIR spectroscopy, contact angle goniometry, GC, GPC, cyclic voltammetry, X-ray crystallography, variable temperature NMR, ESI-MS, UV-Vis
- Familiar with micro/nanofabrication techniques such as metal evaporation, photolithography, etching, profilometry, AFM, SEM/EDX, e-beam lithography
- Technical proficiency in MATLAB, Mathematica, C, Python, FORTRAN, COMSOL, SolidWorks, HTML, MestReNova, ChemBioDraw, MS Office

## Professional Affiliations

American Institute of Chemical Engineers (Elected Vice-President of Caltech's chapter 2012-13)

American Chemical Society