

## Elaine K. Hart

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### Education

Ph.D. Candidate in Civil and Environmental Engineering, Stanford University

M.S. Materials Science and Engineering, Stanford University, 2008

B.S. Chemistry, Harvey Mudd College, 2006, *High Distinction in Chemistry and Humanities*

### Research Experience

Research Assistant Jan 2008 – present  
Jacobson Group Stanford University  
Developing stochastic analytical tools for the grid integration of high penetrations of renewable generation.

Research Assistant Jan – Aug 2007  
Spakowitz Group Stanford University  
Developed a Monte Carlo simulation for liquid crystalline molecules represented as scalene ellipsoids with anisotropic force constants.

Nuclear Science Summer Internship June – Aug. 2006  
Center for Meso, Micro, and Nano Technology Lawrence Livermore National Laboratory  
Developed a dynamics simulation for field ionization and a system model for a pyroelectric neutron source in MATLAB.

Undergraduate Senior Thesis Sept. 2005 – May 2006  
Chemistry Department Harvey Mudd College  
Calculated relative electron transfer rates through oligopeptides using molecular dynamics simulations (Cerius2) and quantum chemical calculations (Gaussian03).

Summer Internship June – Aug. 2005  
Center for Micro and Nano Technology Lawrence Livermore National Laboratory  
Modeled and tested a hydrogen-air PEM fuel cell. Studied optical properties of photonic crystals and diamond Schottky diodes by spectroscopic methods.

Undergraduate Summer Internship June – Aug. 2004  
Chemistry and Materials Science Division Lawrence Livermore National Laboratory  
Prepared diamond anvil cells for high pressure, high temperature experiments. Monitored the decomposition of nitromethane via infrared, raman, and UV/VIS spectroscopy.

### Teaching Experience

Teaching Assistant, CEE172P/272P: Distributed Generation and Grid Integration of Renewables, Stanford University, Winter 2010 and Winter 2011.

Writing Consultant, Writing Center, Harvey Mudd College, Sept. 2004 – May 2006.

Grader, Chemistry 52: Physical Chemistry: Group Theory, Quantum Chemistry, and Spectroscopy, Harvey Mudd College, Spring 2006.

## Employment

Writing Center, Harvey Mudd College

Writing Consultant

Assisted students with essays, lab reports, and general writing skills.

Claremont, CA

Sept. 2004 – May 2006

Chemistry Department, Harvey Mudd College

Laboratory Assistant and Grader

Facilitated a freshman chemistry laboratory. Graded Quantum Chemistry and Freshman Chemistry Laboratory.

Claremont, CA

2004–2006

## Publications

[Submitted] E. K. Hart, E. D. Stoutenberg, and M. Z. Jacobson, “The Potential of Intermittent Renewables to Meet Electric Power Demand: A Review of Current Analytical Techniques,” Submitted to Proc. IEEE.

[In Press] E. K. Hart and M. Z. Jacobson, “A Monte Carlo Approach to Generator Portfolio Planning and Carbon Emissions Assessments of Systems with Large Penetrations of Variable Renewables,” Renewable Energy, 2011.

J. D. Morse, R. S. Upadhye, R. T. Graff, C. Spadaccini, H. G. Park, and E. K. Hart, “A MEMS-based reformed methanol fuel cell for portable power,” J. Micromech. Microeng. 17(2007) S237-S242.

## Conference Presentations

E. K. Hart and M. Z. Jacobson, “The Role of Meteorological Forecasting in Quantifying the Carbon Emissions Associated with Highly Intermittent Renewable Portfolios,” American Geophysical Union Fall Meeting, San Francisco, CA, 2010.

E. K. Hart and M. Z. Jacobson, “An Optimization and Monte Carlo Planning Approach for High Penetrations of Intermittent Renewables,” INFORMS Annual Meeting, Austin, TX, 2010.

[Poster] E. K. Hart and M. Z. Jacobson, “Planning a Target Renewable Portfolio Using Atmospheric Modeling and Stochastic Optimization,” American Geophysical Union Fall Meeting, San Francisco, CA, 2009.

[Poster] E. K. Hart, M. Dvorak, M. Z. Jacobson, “Pushing the Limits of the Grid: Aggressive Wind Energy Penetration Scenarios,” AWEA Windpower Conference, Chicago, IL, 2009.

[Poster] E. K. Hart, M. Dvorak, M. Z. Jacobson, “Power Flow Simulations of a More Renewable California Grid Utilizing Wind and Solar Insolation Forecasting,” American Geophysical Union Fall Meeting, San Francisco, CA, 2008.

[Poster] E. K. Hart and R. J. Cave, “Peptide Bridge-Mediated Electron Transfer Between DMPD and Pyrene-Sulfonyl,” American Chemical Society National Meeting, Atlanta, GA, 2006.

[Poster] E. K. Hart, G. R. Van Hecke, and R. J. Cave, “Theoretical and Experimental Studies of the Electronic States of Cobalt (II) Stearate and Dimeric Copper (II) Stearate,” International Symposium on Metallomesogens, Lake Arrowhead, CA, 2005.

## Service and Activities

President, Associated Students of Harvey Mudd College (HMC), 2005–2006

Volunteer, Katrina on the Ground, 2006

Moderator, Sustaining the World Panel, HMC 50th Anniversary Conference, 2006

HMC Board of Trustees Presidential Search Committee, 2005

Co-chair of the HMC Student-Faculty Committee, 2004–2005

HMC Leadership Development Committee, 2004

Organizer of the HMC Voter Registration Drive, 2004

**Honors and Awards**

National Science Foundation Graduate Research Fellowship, 2007

Stanford Graduate Fellowship, 2006

Barry M. Goldwater Scholarship, 2004

National Merit Scholarship, 2002

**Skills**

Languages: C++, Fortran, Java

Software: MATLAB, ArcGIS, MathCad, Mathematica, Gaussian98/03

Laboratory Instrumentation: UV/VIS, IR, and Raman, Atomic Absorption, and NMR spectroscopy, Scanning Electron Microscopy, X-Ray Diffraction, HPLC, and GC-MS

**Professional Memberships**

Society of the Sigma Xi