Erik Sanders Cheng
XXXXXXXXXXXXXXXX
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Education

UC Berkeley, Berkeley, CA **August 2014 - Present**
Bachelor's of Science in Chemistry (anticipated May 2018)
GPA: 3.4

Research Interests

My fields of interest are physical and materials chemistry, particularly in the nano and mesoscale manifestations of quantum mechanical effects. Though my work has largely been experimental up to now, my hope is to transition into application and development of computational and theoretical models in these fields.

Publications

Rizzuto, A. M., **Cheng, E. S.,** Lam, R. K., Saykally, R. J. "Surprising Effects of Hydrochloric Acid on the Water Evaporation Coefficient Observed by Raman Thermometry" ***J. Phys. Chem. C.*** (2017)

Conference Posters

"Anodization as a Low Cost, Scalable, and Tunable Nanoscale Manufacturing Technique", **Rio Grande Symposium for Advanced Materials.** Albuquerque, NM. (2016)

"Effects of Temperature and Morphology on Piezoelectricity in Crystalline Sucrose", **Chem 4B Special Project Presentations.** Berkeley, CA. (2015)

"Chemical Analysis of MoS_2 Nanoparticles Formed by Ultrasonic Exfoliation", **Summer Undergraduate Research Symposium**. Cedar Falls, IA. (2013)

Research Experience

Saykally Group, UC Berkeley, Berkeley, CA **May 2015 - Present**

- Researching effects of solutes and surfactants on the kinetics of water evaporation using Raman thermometry. Supervised by Dr. Tony Rizzuto and Professor Richard J. Saykally.
- Maintain and operate vacuum chamber, liquid pump and microjet ensemble for droplet train generation.
- Responsible for maintaining and operating a Raman spectroscopy setup (utilizing Class IV Ar+ laser); maximize signal to noise by daily adjustments of optics elements, as well as noting proper droplet formation in vacuum chamber by photodiode observation. Determine quality of data by observation of Raman spectrum features. Designed a mask for CCD fiber optic to cut background interference by around 90%.
- Practice quantitative acid/base chemistry, both from liquid and solid stock, in preparation of solutions for study.

Sandia National Labs, Org 1728, Albuquerque, NM **June 2016- Aug 2016**

- Used electrical analysis and optical microscopy techniques (Keyence software) to develop a reliable process for quantifying results of aluminum anodization and etching process. Reduced uncertainty by a factor of ~10.
- Was responsible for maintenance and operation of the anodization setup. Used results of analysis to optimize process factors such as bath temperature, acidity, and etch times.
- Created electrodeposited patterns of gold on a nickel substrate, studying the effect of varying factors in template creation, strikes, and electrodeposition bath. Worked in Class 100 clean room using photolithography and electroplating techniques.
- Analyzed gold structures using specialized optical microscopy software and profilometer readings. Developed a template for quickly and easily comprehensible presentation of results to clients.

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University of Northern Iowa, Physics Department, Cedar Falls, IA **June 2013 to August 2013**

- Analyzed synthetic crystals based on elemental properties and physical features using SEM and EDX techniques.
- Developed a categorization system for easily interpreting results of SEM and EDX measurements.
- Tested and debugged code for Arduino units, constructed and wired go karts for use in a physics summer camp.

Other Experience

Course Staff **January 2015-Present**

Data 8, UC Berkeley

- Lead classroom-style tutoring sessions for small groups of students (5 each) as an extension to Data 8.
- Create lectures unique content (ipython notebooks with questions and code challenges) for these groups.
- Select and clean large data sets from online sources as material in instructional materials.
- Worked with Professor John Denero in enhanced plotting functionalities in datascience, a custom software package developed specifically for the teaching of this course. Improved method consistency within the package. Also wrote previously missing documentation, deployed though Sphinx. Used by >700 students.
- Editing and proofread conceptual questions, debug and test coding questions in course assignments.
- Grade assignments and answer student questions in office hours, labs, and through an online class forum.

External Vice President and Instructor **August 2015-Present**

Rubik's Cube Club at Berkeley

- Organize and instruct Math 98, a course on solutions of Rubik's cubes. Lead two small groups of students in weekly sessions; one focused on a basic solution, and the other on an advanced, faster solution.
- Co-organized multiple officially sanctioned competitions, each drawing over 200 guests. Manage staff during events; enforce systems to ensure timeliness and efficiency, regulate foot traffic, monitor morale.
- Ensure a positive relationship with the community by prompt replies to inquiries via Facebook and email.

Relevant Coursework

Undergraduate Chemistry: General Chemistry I&II (with lab), Organic Chemistry I&II (with lab), Inorganic Chemistry I&II, Quantum Mechanics

Undergraduate Physics: Mechanics, Electricity and Magnetism and Thermodynamics, Modern (Optics and Relativity)

Undergraduate Computer Science: Structure and Interpretation of Computer Programs, Data Structures, Foundations of Data Science

Undergraduate Statistics: Probability and Mathematical Statistics for Data Science, Concepts in Computing with Data, Probability for Data Science, Directed Study for Undergraduates (Case Studies)

Graduate Chemistry: Advanced Quantum Mechanics

Skills

Chemistry: Titration, pipetting, electrochemistry, organic synthesis, purification techniques, photolithography

Analysis: Spectroscopy (Raman, IR, UV-vis), Chromatography (column, HPLC, GC, TLC), Microscopy (optical, scanning electron), NMR (H and ^{13}C), melting point analysis, calorimetry

Programming languages: Python, Java, R, SQL, XML, HTML5/CSS3

Technologies: git/git bash/Github, jUnit, command line, JetBrains IDEs, Autodesk Inventor, LaTeX, Chemdraw, WebMO, MestReNova

Hardware: Soldering, wiring, milling, drill press

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Statistics/ML: Hypothesis and A/B testing, classifiers (KNN, NB, decision trees), regression, Markov models

Languages: English (full native fluency), Chinese (native, conversationally fluent), German (elementary)

Honors and Awards

Outstanding Performance Awards (x2) 2014

Awarded by Iowa High School Music Association at Solo/Small Ensemble Festival. 13 are awarded at each of the 3 festivals (one of each tier of high school); I received one for violin and one for bassoon.

National Merit Scholarship Finalist 2014

With a qualifying score of 228. Less than 1% of test takers nationwide score well enough to qualify.

AP Scholar with Distinction 2014

Granted to students who receive an average score of at least 3.5 on all AP Exams taken, and scores of 3 or higher on five or more of these exams.

Interests

I like to solve Rubik's cubes and related puzzles competitively, and have been since 2011. I currently hold the Iowa state records for the 4x4x4 cube. Was formerly ranked in the top 100 nationally for 5x5x5 and Megaminx (it's like a Rubik's cube but with 12 sides).

I also like video games, with Tetris, which I've been playing since 2007, as my main focus. I'm currently ranked grandmaster on tetrisfriends.com.

I'm also an avid climber (boulderer), and have been for a little over a year now. I've climbed in Marin, CA and Albuquerque, NM, but mostly train in the gym. I will be participating in my first competition in February.