

XIANGKUN (ELVIS) CAO

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EDUCATION

- Cornell University** Aug. 2016 - Present
Ph.D. Student in Mechanical and Aerospace Engineering (current GPA: 3.97) Ithaca, NY, USA
Minor: Energy and Sustainability; Infection and Immunity; Entrepreneurship
Thesis Committee: David Erickson (chair), Tobias Hanrath, Saurabh Mehta
Research Interests: FeverPhone for Fever Diagnosis, HI-Light for CO₂ Reduction
- Nanyang Technological University** Sept. 2017
Visiting Ph.D. Student in School of Biological Sciences Singapore
ACLS International Summer School 2017: Big Data Analysis for Health and Biomedical Sciences
- Massachusetts Institute of Technology** Sept. 2015 - May 2016
Visiting Master's Student in Nuclear Science and Engineering Cambridge, MA, USA
Advisors: Mujid S. Kazimi (inviter), Michael P. Short, Thomas J. McKrell
Research Interests: Accident Tolerant Fuel Cladding
- McGill University** Aug. 2014 - May 2016
M.Eng. (Thesis) in Mining and Materials Engineering (GPA: 3.86) Montréal, Québec, Canada
Thesis Committee: Roderick I.L. Guthrie (chair), Mihaiela Isac, Jun Song, George P. Demopoulos
Research Interests: Aqueous Particle Sensor for Microbubble Detection
- Xi'an Jiaotong University** Sept. 2009 - June 2013
B.Eng. in New Energy (Major GPA: 90.3/100) Xi'an, China
B.A. in English Literature (Major GPA: 86/100) Xi'an, China
'Tsien Hsue-shen' Elite Class (Top 1%, Named after Father of Chinese Rocketry)

MAJOR AWARDS AT CORNELL

- Nominee for U.S. Forbes 30 Under 30 in Energy 2019, Forbes Magazine (ongoing) 2018
- Local Pathways Fellowship (LPF), UN SDSN – Youth Initiative (SDSN Youth) 2018
- Forbes Under 30 Scholar, Forbes Magazine 2018
- National Finalist, Young Champions of the Earth in China, UN Environment 2018
- Third Place Award, "Our Microbes, Our Global Health" Symposium Poster Contest 2018
- National Third Place Prize Winner, "Science in a minute" Video Contest, AAAS 2018
- Awardee, the inaugural **\$20K "Scale-Up and Prototyping"** Award, Cornell University 2017
- Cornell Graduate Student Conference Grant (SPIE'17) 2017
- Sigma Xi Annual Meeting and Student Research Conference Travel Grant 2017
- **\$20K Grand Prize (1/1,150)**, "Create the Future" Design Contest, NASA Tech Briefs 2017
- Best Poster Award, ACLS International Summer School, Tokyo Tech & NTU 2017
- First Place in Student Research Presentation, 9th Annual NYS Biotech Symposium 2017
- National Graduate Division Winner, Sigma Xi Student Research Showcase, Sigma Xi 2017
- Best Pitch, MIT-CHIEF China Trip Business Pitch, Zhongguancun Software Park 2017
- Excellence in Research, Journey through Science, the New York Academy of Sciences 2017
- People's Choice Award, Three Minute Thesis (3MT) Competition, Cornell University 2017

EMPLOYMENT

- Graduate Research Assistant**, Cornell University, Ithaca, NY, USA Dec. 2016 - Present
Integrated Micro & Nano Fluidic Systems Laboratory (Erickson Lab)
- Part-time Consultant**, LeadYouAbroad Educational Group, Shanghai, China Feb. 2018 - Present
Shanghai LeadYouAbroad Educational Technology Co., Ltd. (North America Division)
- Graduate Teaching Assistant**, Cornell University, Ithaca, NY, USA Aug. 2017 - Dec. 2017
MAE 2210: Thermodynamics (Instructor: Elizabeth M. Fisher)
- Visiting Graduate Research Assistant**, MIT, Cambridge, MA, USA Sept. 2015 - May 2016
Mesoscale Nuclear Materials Laboratory (Short Lab)
- Graduate Teaching Assistant**, McGill University, Montréal, Québec, Canada Feb. 2015 - May 2015
MIME 455: Advanced Process Engineering (Instructor: Frank Mucciardi)
- Graduate Research Assistant**, McGill University, Montréal, Québec, Canada Aug. 2014 - Sept. 2015
McGill Metals Processing Centre (Guthrie Lab)
- Research Assistant**, Xi'an Jiaotong University, Xi'an, China Sept. 2012 - June 2014
Ministry of Education Key Laboratory of Thermal Fluid Science and Engineering (Yaling He's Lab)
- Industrial Trainee**, Guodian United Power Technology Co., Ltd, Hebei, China July 2012 - Aug. 2012
Wind Turbine Manufacturing Division (Baoding Branch)
- Undergraduate Research Assistant**, Xi'an Jiaotong University, Xi'an, China Sept. 2011 - June 2012
State Key Laboratory of Multiphase Flow in Power Engineering (Bofeng Bai's Lab)

EXPERIENCE

- FeverPhone for Acute Febrile Illness Diagnosis using a Mobile Device** Dec. 2016 - Present
Thesis Research (joint work with J. Kim, Cornell) *Ithaca, NY*
- Developed a latex bead nanoparticle-based two-color Malaria-Typhoid dual detection LFIA.
 - Conducted extensive clinical sample testing for the validation study. Demonstrated significantly increased sensitivity and specificity compared to state-of-the-art approaches.
 - Presented research at the **SPIE'18** conference. Received **Best Poster Award** twice, **Sigma Xi Graduate Division Winner Award**, etc. Wrote two papers as the first/co-first author.
- Point of Care Inflammation Assessment with a Mobile Device** Dec. 2016 - Present
Thesis Research (joint work with Y. Serge, Cornell) *Ithaca, NY*
- Developed a Europium nanoparticle-based LFIA for co-detection of C-Reactive Protein (CRP) and Procalcitonin (PCT) antigens in human serum.
 - Performed validation study and demonstrated good correspondence with gold standard approaches.
 - Wrote one paper as the co-first author.
- HI-Light: A Solar Thermal Reactor for CO₂ Reduction** Dec. 2016 - Present
Project Lead (joint work with Y. Kammer, J. Silva, Cornell) *Ithaca, NY*
- Constructed chemical reactors of 0.1L, 0.3L, and 1L, for solar thermal conversion of CO₂ to fuels.
 - Received **\$20K International Grand Prize** from NASA Tech Briefs "Create the Future" Design Contest, and **\$20K "Scale-up and Prototyping Award"** from Cornell Engineering.

- Presented research at the **SPIE'18** conference.

Multi-metallic Layered Composite Accident Tolerant Fuel Cladding
Research Assistant (joint work with S. McAlpine, MIT)

Sept. 2015 - May 2016
 Cambridge, MA, USA

- Performed thermochemical analysis to identify promising metal candidates for the multi-metallic layered structure with FactSage.
- Contributed to the building of the oxidation experimental set-up.

A Particle Sensor for Optimizing Inclusion Removal by Bubbles
Project Lead (joint work with S. Chang, McGill)

Aug. 2014 - Sept. 2015
 Montréal, Québec, Canada

- Designed an aqueous particle sensor system for in-situ and on-line measurement for microbubble.
- Optimized gas bubbling from ladle shroud for inclusion removal in water modeling tundish.
- Published **four refereed journal papers** including ISIJ Int., METALL MATER TRANS B.

A Swirl Generator in High Water-cut Crude Oil Cold Transmission
Undergraduate Research Assistant (joint work with C. Wang, R. Han, Z. Yan, R. Liu, M. Hu, Xi'an Jiaotong University)

Sept. 2011 - June 2012
 Xi'an, China

- Designed a structure optimized swirl generator, based on numerical simulations with FLUENT.
- Constructed an experimental set-up to test the performance of the swirl generator for water-oil separation, with different oils.
- Project received **Outstanding Award (Top 4/2049)** in the National University Student Social Practice and Science Contest on Energy Saving & Emission Reduction, by Ministry of Education of China.

PUBLICATIONS

1. **Cao, X.**, Lu, Z., Mehta S., Erickson D., "Two-Color Multiplexed Lateral Flow Immunoassay for Point-of-Care Differential Detection of Malaria and Typhoid." In Preparation (2018)
2. Kim J.*, **Cao X.***, Mehta S., Erickson D., "Quantitative Two-Color Multiplexed Lateral Flow Immunoassay for Detecting Malaria." In Preparation (2018) * indicates equal contribution.
3. Serge Y.*, **Cao X.***, Mehta S., Erickson D., "A Lateral Flow Immunochromatographic Assay for Point-Of-Care Detection of C-Reactive Protein (CRP) and Procalcitonin (PCT) Antigens in Human Serum." In Preparation (2018) * indicates equal contribution.
4. Zhou Z., Liu X., Xu J., **Cao, X.**, Zhu X., "Elemental mercury removal over a novel starch modified MnOx/bentonite composites." Under Review (2018)
5. Zhou Z., Cao T., Liu X., Xu S., **Cao, X.**, Xu Z., Xu M., "Vanadium silicate (EVS)-supported silver nanoparticles: a novel catalytic sorbent for elemental mercury removal from flue gas." Under Review (2018)
6. Zhou Z., Xu X., **Cao, X.**, Xu J., Liao Z., Xu M., "Deeper insight into the inhibitory effect of H₂O on elemental mercury removal over MnOx based catalyst from coal-fired flue gas." Under Review (2018)
7. Liu X.*, **Cao, X.***, Liu Y., Li X., Wang M., Li M., "Branched Multiphase TiO₂ with Enhanced Photoelectrochemical Water Splitting Activity." International Journal of Hydrogen Energy (2018) Accepted * indicates equal contribution.
8. Zhou Z., Liu X., Hu Y., Xu J., **Cao, X.**, Liao Z., Xu M., "Investigation on synergistic oxidation behavior of NO and Hgo during the newly designed fast SCR process." Fuel 225, 134-139 (2018)

9. Chang S., **Cao, X.**, Zou Z., "Regimes of Micro-bubble Formation Using Gas Injection into Ladle Shroud." Metallurgical and Materials Transactions B 49 (3), 953-957 (2018)
10. Chang S., **Cao, X.**, Zou Z., Isac M, Guthrie R., "Micro-bubble Formation under Non-wetting Conditions in a Full-scale Water Model of a Ladle Shroud/Tundish System." ISIJ International 58 (1), 60-67 (2018)
11. Chang S., **Cao, X.**, Hsin C., Zou Z., Isac M, Guthrie R., "Removal of Inclusions using Micro-bubble Swarms in a Four-strand, Full-scale, Water Model Tundish." ISIJ International 56 (7), 1188-1197 (2016)
12. Chang S., **Cao, X.**, Zou Z., Isac M, Guthrie R., "Micro-Bubble Swarms in a Full Scale Water Model Tundish." Metallurgical and Materials Transactions B 47 (5), 2732-2743 (2016)

TALKS & PROFESSIONAL ACTIVITIES

1. "Plasmonic Catalysts for Ammonia Synthesis", Abstract 537948, Oral Presentation at the 2018 American Institute of Chemical Engineers Annual Meeting (AIChE'18), Oct. 2018, Pittsburgh, PA, USA. (Scheduled)
2. "Fever Diagnosis on Your Phone", Oral Presentation at the 2018 Sibley Graduate Research Symposium (SGRS'18), Oct. 2018, Ithaca, NY, USA. (**Shows most promise in "Drafting the Future"**)
3. "FeverPhone", Poster 4, Poster Presentation at the "Our Microbes, Our Global Health" Symposium, Aug. 2018, Ithaca, NY, USA. (**International Third Place Winner**)
4. "HI-Light Technology: A Solar-thermocatalytic Reactor for CO₂ Reduction", Poster 1, Poster Presentation at the Carbon Dioxide Removal/New Carbon Economy Consortium workshop, May 2018, Ithaca, NY, USA.
5. "FeverPhone", Video Presentation at the 2018 Emerging Researchers National (ERN) Conference in STEM, Feb. 2018, Washington, DC, USA. (**National Third Place Winner**)
6. "HI-Light: An Optofluidic Reverse Combustion Reactor for Photothermo-catalytic Conversion of CO₂ into Fuels", Paper 10491-36, Oral Presentation at the 2018 Photonics West and BIOS Conferences (SPIE BIOS'18), Jan. 2018, San Francisco, CA, USA.
7. "A Smartphone Based Dual-plexed Molecular Diagnostics Platform for Point-of-care (POC) Inflammation Assessment", Paper 10485-28, Oral Presentation at the 2018 Photonics West and BIOS Conferences (SPIE BIOS'18), Jan. 2018, San Francisco, CA, USA.
8. "FeverPhone: Fever Diagnosis on Your Phone", Invited Talk as Featured Graduate Speaker, at Sigma Xi Student Research Conference, Nov. 2017, Raleigh, NC, USA.
9. "FeverPhone: An Expandable Diagnostic Platform", Invited Talk at the 2nd Annual SPARK Talks of Cornell University (SPARK'17), Oct. 2017, Ithaca, NY, USA.
10. "Application of Smartphone Technology in Food Safety", Invited Talk at Journey Through Science Day at the New York Academy of Sciences, Oct. 2017, New York City, NY, USA.
11. "FeverPhone: Point of Care Diagnosis of Acute Febrile Illness using a Mobile Device", Poster 23, Poster Presentation at the ACLS International Summer School (ACLS'17), Sept. 2017, Singapore. (**Best Poster Award**)
12. "The Commercial Opportunities in Carbon Conversion", Business Pitch at the 2017 MIT-CHIEF China Trip in Zhongguancun Software Park Development Co, Ltd., July. 2017, Beijing, China. (**Best Pitch Award**)

13. "Facile Preparation of Nano-branched TiO₂ Thin Films for Photoelectrochemical Hydrogen Generation", Poster 48, Poster Presentation at the 3rd International Symposium on Energy Conversion and Storage (ISECS'17), June 2017, Nanjing, China.
14. "A Multiscale 3D Simulation of an Optofluidic Reverse Combustion Reactor for Photocatalytic Conversion of CO₂ into Hydrocarbons", Poster 65, Poster Presentation at the 3rd International Symposium on Energy Conversion and Storage (ISECS'17), June 2017, Nanjing, China.
15. "FeverPhone: Fever Diagnosis with a Mobile Device", Poster 6, Poster Presentation at the 9th Annual New York State Biotechnology Symposium (NYSBS'17), May 2017, Syracuse, NY, USA. **(Best Poster Award)**
16. "FeverPhone", Invited Talk at Ithaca's March for Science Event, Apr. 2017, Ithaca, NY, USA.
17. "FeverPhone: Fever Diagnosis on Your Phone", Online Contest at Sigma Xi's 5th Annual Student Research Showcase, Apr. 2017, North Carolina, USA. **(National Graduate Division Winner)**
18. "FeverPhone", Contest Talk at Cornell's 3rd Three Minute Thesis (3MT) Competition, Mar. 2017, Ithaca, NY, USA. **(People's Choice Award)**
19. "An Aqueous Particle Sensor (APS) for Monitoring Inclusion Removal by Microbubbles in Tundish Operations", Paper 963, Oral Presentation at the XXVIII International Mineral Processing Congress (IMPC'16), Sept. 2016, Québec City, Québec, Canada.
20. "From Iron Man to Micro Bubbles", Contest Talk at McGill's 4th Three Minute Thesis (3MT) Competition, Apr. 2015, Montréal, Québec, Canada. **(Finalist)**
21. "Optimization of Inclusion Removal by Micro-bubbles with an Aqueous Particle Sensor", Poster Presentation at the Department of Materials Engineering, McGill University, Dec. 2014, Montréal, Québec, Canada.

LEADERSHIP

Vice President

Chinese Entrepreneur Association at Cornell (CEAC)

Aug. 2018 - Present
Ithaca, NY, USA

- Organized orientation events for new Chinese Ph.D. students at Cornell.

Vice President and Treasurer

Cornell Chinese Visiting Scholars/Students Association (CVSA)

Sept. 2017 - Present
Ithaca, NY, USA

- Coordinated events for over 500 Chinese visiting students, professors, and postdocs at Cornell.
- Organized campus workshops and networking activities.

Web Manager and Book Editor

Xi'an Jiaotong University Online Overseas Education Forum (XJTU BBS GoAbroad Forum) Xi'an, China

Apr. 2016 - Present

- Organized graduate school application online Q&A events for over 6,000 students in Xi'an Jiaotong University.
- Edited a 120-page graduate school application guide "My story of going abroad" consisting of 25 stories of XJTUers from 10 majors.

Class Representative, Youth League Secretary, and Party Secretary

Xi'an Jiaotong University 'Tsien Hsue-shen' Honors College

Sept. 2009 - June 2012
Xi'an, China

- Organized team bonding activities aiming for increasing interactions between classmates and job talks facilitating career development for students.
- Received "Outstanding Student Leader" award twice.

TEACHING

Teaching Assistant

Cornell University, Instructor: Elizabeth M. Fisher

Aug. 2017 - Dec. 2017
Ithaca, NY, USA

- MAE 2210: Thermodynamics

Teaching Assistant

McGill University, Instructor: Frank Mucciardi

Feb. 2015 - May 2015
Montréal, Québec, Canada

- MIME 455: Advanced Process Engineering

MENTORED PROJECTS

1. Cheng-Hung (Jason) Hsin. "Water modeling experiments and real-time particle detection sensors". Undergraduate Co-op Research Project, Spring 2015 (The Co-op in Materials Engineering Program, McGill University, Montréal, Québec, Canada)
2. Sarkar Nathan. "A Capillary Paper Biofluid Viscometer". Undergraduate Honors Thesis Project, Spring 2018 (The Biological Sciences Honors Program, Cornell University, Ithaca, NY, USA)

PROFESSIONAL MEMBERSHIP

- The International Society for Optics and Photonics (SPIE), 2018 - Present
- American Physical Society (APS), 2017 - Present
- The New York Academy of Sciences (NYAS), 2017 - Present
- Sigma-Xi, the Scientific Research Honor Society, 2017 - Present
- American Society for Gravitational and Space Research (ASGSR), 2017 - Present
- Canadian Institute of Mining, Metallurgy and Petroleum (CIM), 2014 - Present

COURSE HIGHLIGHTS

- CHEE 631 Foundations of Fluid Mechanics, Fall 2014, McGill
- MIME 653 Transport Phenom-Process Metal, Fall 2014, McGill
- MAE 6510 Advanced Heat Transfer, Fall 2016, Cornell
- MAE 5430 Combustion Processes, Fall 2016, Cornell
- MAE 6620 Biomed Tech Point of Care Diag, Spring 2017, Cornell
- MSE 5330 Materials for Energy Production, Storage, and Conversion, Fall 2018, Cornell
- NBA 5070 Entrepreneurship for Scientists and Engineers, Fall 2018, Cornell

TECHNICAL STRENGTHS

Programming Languages

Python (proficient), C++, LabVIEW, DASyLab

Experimental skills

LFIA development, Microfluidics, Materials characterization

MISCELLANEOUS

Languages

Proficient in Mandarin and English

Hobbies

Reading, Singing, Photography

Fun facts

I can swing books with each of the five fingers of my right hand!

Last updated: October 8, 2018