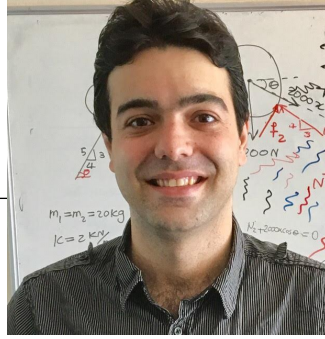
Asghar Aryanfar, PhD



Current
- Assistant Professor, Mechanical Engineering
AUB *American University of Beirut*
311 Oxy Engineering Complex, x3725 [map]
- Visiting Associate, Environmental Science
California Institute of Technology [map]

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Lab of Energy Materials and Sustainability (*LEMS*)

Citizenship
- United States
- Iran

Education
- **PhD** in Mechanical Engineering, Caltech, Pasadena, CA, USA — Sep'09 - Jun'15
Dissertation: Dendrites inhibition in rechargeable lithium metal batteries
Co-Advisors: Michael R. Hoffmann (NAE), William A. Goddard III (NAS)
- **MSc** in Mechanical Engineering, Caltech, Pasadena, CA, USA — Sep'09 - Jun'10
- **BSc** in Mechanical Eng (***top* 5%**), Sharif U of Tech, Tehran, Iran — Sep'05 - Jun'09
Thesis:Modeling internal hydraulic jump in density currents
- **BSc** in Civil Engineering (***top 2%***), Sharif U of Tech, Tehran, Iran — Sep'04 - Jun'08

Previous Appts
- Assistant Professor, Mech Eng, Bahcesehir University, Istanbul, Turkey — Sep'16 - present
✓ *Multi-physics simulation of coupled transport and electrochemical reaction in rechargeable batteries.*
✓ *Start-up (funded) on developing novel save and high-energy batteries (Battergy LLC).*
✓ *Teaching various (under)graduate courses in Mechanical and Civil engineering.*
- Postdoctoral Scholar, Material Sci. & Eng., UCLA, Los Angeles, CA — June'15 - Aug'16
✓ *Performing numerical simulation for developing predictive models for high temperature corrosion of metals.*
- Research Assistant, Caltech, Pasadena, CA — Sep'09 - May'15
✓ *Developing algorithms and numerical simulations for improving life and predicting of failure mechanisms for advanced rechargeable lithium-based batteries.*
✓ *Design, fabrication and integration of innovative battery cells. (patented)*
✓ *Experimenta investigations for boosting the reliability and energy density of rechargeable batteries.*
✓ *Design, fabrication and assembly of solar-powered prototype for wastewater treatment system. (1^{st} prize winner, Gates Foundation)*
✓ *Teaching/TA for 4 under/graduate courses.*
- Researcher (HVAC), FARAB hyrdopower plant Co., Tehran, Iran. — Jun'07 - Sep'07
- Researcher (Design), Azerbaijan Steel rolling Co., Mianeh, Iran. — Jun'06 - Sep'06

Honors
- Internal grant competition award for research advancement. (**150K** *TRY*) — Nov'17
- Entrepreneurship awards (KOSGEB + BIGG). (**300K** *TRY*) — Nov'17, May '18
- Senior-level engineering job offer from Tesla and Intel — Jun '16
- **American Institute of Physics** interview on extending battery's lifetime : [AIP], [Phys.org], [Chemeurope]. — Oct '15
- **Cover Image**, The Journal of Chemical Physics: [Link] — Oct'15
- **CNN** interview on a novel method for electrochemical treatment of watewater. [CNN] — May'13
- **Solidworks** cover design. [SolidWorks] — Jun'13
- 1^{st} Prize: Grant Challenge, *Gates Foundation* ,[Science], [CNN], [Reuters] — Aug'12
- PhD Fellowship, California Institute of Technology — Sep'09
- **Top 2%**, Undergraduate class, Sharif U of Tech, Tehran, Iran — Sep'04 - Jun'09
- **6/15000+**, National Civil Engineering Olmpiad, Iran — Jul'08
- **1/500000+**, National college entrance exam (Azad) — Jun'04

Journal Articles

1. **Asghar Aryanfar**, M Hoffmann, W Goddard III : *Finite pulse waves for efficient suppression of evolving mesoscale dendrites in rechargeable batteries*, ***Phys Rev E***, 100, 042801 **2019**

2. **Asghar Aryanfar**, William A. Goddard III, Jaime Marian: Constriction Percolation Model for Coupled Diffusion-Reaction Corrosion of Zr in PWR, ***Corr Sci***, 158, 108058 **2019**

3. M. Reyes. **Asghar Aryanfar**, S. W. Baek, J. Marian: *Multilayer interface tracking model of zirconium clad oxidation*, ***J Nucl Mat***, 509, 550-565. **2018**

4. **Asghar Aryanfar**, D.J. Brooks, W. A. Goddard III: *Theoretical pulse charge for optimal inhibition of growing dendrites*, ***MRS Adv***, 1, 1-7 **2018**

5. C. Xu, Z. Ahmad, **Asghar Aryanfar**, V. Viswanathan, J. R. Greer: *Enhanced strength and temperature dependence of mechanical properties of Li at small scales and its implications for Li metal anodes*, ***PNAS***, 114 (1), 57 **2017**

6. **Asghar Aryanfar**, J. Thomas, A. Van der Ven, D. Xu, M. Youssef, J. Yang, B. Yildiz, J. Marian: *Integrated computational modeling of water-side corrosion in zirconium metal clad under nominal LWR operating conditions*, ***JOM***, 47, 1543-1851. **2016**

7. L. M. Kasmaee, **Asghar Aryanfar**, Z. Chikneyan, M.R. Hoffmann, A. J. Colussi: *Improving solid-electrolyte interfaces via underpoetential solvent electropolymerization*, ***Chem Phys Lett***, 661, 65. **2016**

8. **Asghar Aryanfar**, T. Cheng, , A. J. Colussi, B. V. Merinov, W. A. Goddard, M. R. Hoffmann: *Annealing kinetics of electrodeposited lithium dendrites*, ***J Chem Phys***, 143, 134701. **2015**

9. **Asghar Aryanfar**, D. J. Brooks, B. V. Merinov, A. J. Colussi, W. A. Goddard, M. R. Hoffmann: *Thermal relaxation of lithium dendrites*, ***Phys Chem Chem Phys***, 17, 8000 **2015**

10. **Asghar Aryanfar**, D. J. Brooks, B.V. Merinov, W. A. Goddard III, A. J. Colussi, M. R. Hoffmann: Dynamics of lithium dendrite growth and inhibition: pulse charging experiments and monte carlo calculations, ***J Phys Chem Lett***, 5(10), 1721 **2014**

11. **Asghar Aryanfar**, D. J. Brooks, A. J. Colussi, M. R. Hoffmann: *Quantifying the Dependence of Dead Lithium Crystals on Cycling Period in Lithium Metal Batteries*, ***Phys Chem Chem Phys*** , 16, 24965 **2014**

12. K. Cho, Y Qu, D. Kwon, H. Zhang, C. Cid, **Asghar Aryanfar**, M. R. Hoffmann: *Effects of anodic potential and chloride ion on overall reactivity in semiconductor electrochemical reactors designed for solar-powered wastewater treatment*, ***Env Sci & Tech***, 48(4), 2377 **2014**

Conference Papers

1. **A. Aryanfar**, et al: Bulk properties of amorphous lithium dendrites, ECS Transactions 80 (10), 365-370 **2017**

2. **A. Aryanfar**, et al: *Lithium dendrite inhibition on post-charge anode surface: The kinetics role*, MRS proceedings, V 1774, **2015**

3. **A. Aryanfar**, et al: *Lithium dendrite growth control using local temperature variation*, MRS Proceedings, V 1680. **2014**

Book Chapter

1. **A.Aryanfar**, et al: *Electropolymerization: Fundamental and Applications/ Electrodes and Double Layers*, **Advances in Material Science and Engineering**, Vol 39, Nova Publishers, ISBN: 978-1-53616-176-2. **2019**

Patents

- **Asghar Aryanfar**: *Method and device for dendrite research and discovery in batteries*, US Patent App, 14/201, 979. **2017**
- MR Hoffmann, **Asghar Aryanfar**, C Cid, K Cho, D J Kwon, Y Qu:*Self-contained PV-powered Toilet and Domestic Wastewater Disinfection System*, US Pat App, 14/048, 163. **2014**

Invited Talks

• American University of Beirut	May'19	• ICAPP 2016, San Francisco, CA	Ma'16
• EPFL, Lausanne, Switzerland	May'16	• MIT, Cambridge, MA	Jul'15
• ECS, National Harbor, MD	Oct'17	• MRS, San Francisco, CA	Apr '15
• ECS, Chicago, IL	May '15	• ECS, Orlando, FL	May'14
• MIT, Cambridge, MA	Dec'14	• Sharif U of Tech, Tehran, Iran	Mar '14
• MRS, San Francisco, CA	Apr '14	• ECS, Honolulu, HI	Oct '12

Reviewer

- ECS Electrochem Lett
- J Materials Chem A
- J Fluid Mech
- J Electrochem Soc

Teaching Experience

• Finite Element Methods	F'18	• Vehicle Aerodunamics	F'18
• Thermodynamics	F'16, S'18	• Mechanical Components	S'17, S'18
• Transport Phenomena	F'17	• Fluid Mech & heat transfer	S'17, S'18
• Statics & Mech of Mat	F'16, F'17	• Mechanics of Materials	F'10
• Statics and Dynamics	F'11	• Hydraulics	F'07
• Structural Loading	F'06	•Tutoring Sci/Eng Courses	'04-'15

Poster presentation

- Featured research, Caltech Board of Trustees, Pasadena , CA — Jan '12
- International Energy Storage Conference (IPS-19), Pasadena, CA — Jul'12
- Reinvent the Toilet fair, Gates Foundation, Seattle, WA — Aug'12

Skills Python, Matlab, SolidWorks (design and simulation), AutoCAD, Photoshop, LaTeX

Memberships ECS, ASME, ASCE, Caltech Alumni Association

Languages Azerbajani (native) Persian English Turkish

References

1. Prof. Michael R. Hoffmann (NAE)
Professor of Environmental Sciences
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2. Prof. William A. Goddard (NAS)
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3. Dr. Agustin J. Colussi
Senior Scientist, Environmental Science
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4. Dr. Boris Merinov
Director of Energy Conversion and Storage
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5. Prof. Jaime Marian
Associate Professor
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