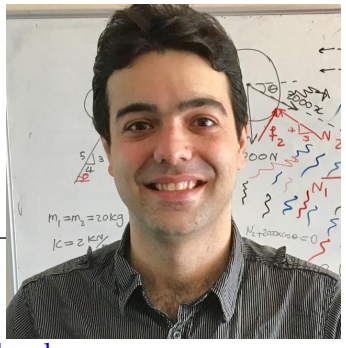

# Asghar Aryanfar, PhD


**Contact**

• Scientific Researcher, Caltech
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Istanbul, Turkey

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**Nationality**

• US PR (Citizen as of Aug'19) • Iranian

**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* 2%, Honors), Sharif U of Tech, Tehran, Iran Sep'05 - Jun'09
*Thesis:Modeling internal hydraulic jump in density currents*
• **BSc** in Civil Engineering (*Top* 2%, Honors), Sharif U of Tech, Tehran, Iran Sep'04 - Jun'08

**Professional Appts**

• Scientific Researcher, Eng & Appl Sci, Caltech, Pasadena, CA Aug'18 - present
✓*Developing predictive models for emerging materials and operative methods for enhancing the safety and longevity of advanced rechargeable batteries.*
✓*Predictive engineering of high-temperature corrosion of metals.*
• Assistant Professor, Mech and Civil Eng, BAU Int Univ. 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

**Honors (Cont'd)**

- **6/15000+**, National Civil Engineering Olmpiad, Iran — Jul'08
- **1/500000+**, National college entrance exam (Azad) — Jun'04

**Journals**

1. Asghar Aryanfar, William Goddard III and Michael Hoffmann: *Optimal Pulse Charging for Inhibition of Mesoscale Dendrites*, J Power Sources, submitted **2019**

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

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

4. **Asghar Aryanfar**, D.J. Brooks, W. A. Goddard III: *Theoretical pulse charge for optimal inhibition of growing dendrites*, MRS Advances, pp. 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), 57-61 **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*, Chemical Physics Letters, 661, 65-69. **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, p 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*, Physical Chemistry Chemical Physics, 17, pp 8000-8005. **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 Physical Chemistry Letters, 5(10), pp 1721-1726. **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*, Physical Chemistry Chemical Physics, 16, pp 24965-24970. **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*, Environmental Science and Technology, 48(4), pp 2377-2384. **2014**

**Conference Proceedings**

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*, Nova Publishers. **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 (bilingual), English (proficient), Turkish (proficient)

**References**

1. Prof. Michael R. Hoffmann (NAE)
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2. Prof. William A. Goddard (NAS)
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3. Dr. Agustin J. Colussi
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4. Dr. Boris Merinov
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5. Prof. Jaime Marian
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