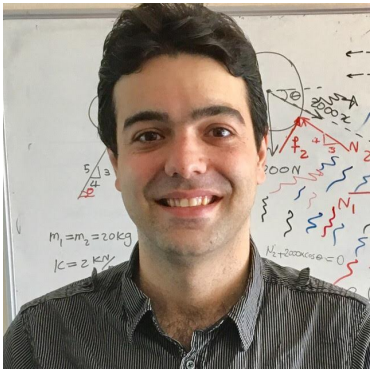
Asghar Aryanfar, PhD



Lab of Energy Materials and Sustainability (***LEMS***)

- Assistant Professor, Mechanical Engineering
AUB American University of Beirut [map]
404 Munib & Angela Masri Institute
- Visiting Associate, Chemical Engineering/EnvSci
California Institute of Technology [map]

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Citizenships:

• USA • Iran

Education:

- **PhD** in Mechanical Engineering (Materials Science Focus), Caltech, Pasadena, CA — Jun'10 - Jun'15
  Co-Advisors: Michael R. Hoffmann (NAE) [link], William A. Goddard III (NAS) [link]
- **MSc** in Mechanical Engineering, Caltech, Pasadena, CA — Sep'09 - Jun'10
- **BSc** in Mechanical Engineering (**top 5**%), Sharif U of Tech, Tehran, Iran — Sep'05 - Jun'09
- **BSc** in Civil Engineering (**top 2**%), Sharif U of Tech, Tehran, Iran — Sep'04 - Jun'08

Previous Employments:

- Visiting Associate, Chemical Eng/Env Sci, Caltech, Pasadena, CA — Aug'18 - Aug'19
- Lecturer, Mechanical and Civil Engineering, Bahçeşehir University, Istanbul, Turkey — Sep'16 - Aug'18
- Postdoctoral Scholar, Material Sci. & Eng., UCLA, Los Angeles, CA — Jun'15 - Aug'16
- Research Assistant, Caltech, Pasadena, CA — Sep'09 - May'15
- Intern Researcher, FARAB hydropower plant Co, Tehran, Iran. — Jun'07 - Sep'07
- Intern Researcher, Azerbaijan Steel rolling Co, Mianeh, Iran. — Jun'06 - Sep'06

Research Team:

Students: Sajed Medlej | Yara Ghamlouche | Dimitri Saad | Jihad Jundi | Rawan Hoteit | Aya Ayoun
Collaborators: William A. Goddard III | Michael R. Hoffmann | Jaime Marian | Irem Sanal

Funding:

- Qatar National Research Fund (Masri Institute at AUB): $\$50K$ — May'20
- University Research Board Research Grant: $\$30K$ — Apr'20
- International Travel grant from AUB: $\$2.5K$ — Mar'20
- Internal grant competition award for research advancement: $\$60K$+$\$40K$ — Nov'17
- Entrepreneurship awards (KOSGEB + BIGG): $\$100K$ — Nov'17, May'18

Honors:

- Senior-level engineering job offers 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 wastewater. [CNN] May'13
- **SolidWorks** cover design. [SolidWorks] Jun'13
- **1st** Prize: Grant Challenge, *Gates Foundation* ,[Science], [CNN], [Reuters] Aug'12
- Graduate Fellowship, California Institute of Technology, Pasadena, CA Sep'09
- **Top 2%**, Undergraduate class, Sharif U of Tech, Tehran, Iran Sep'04 - Jun'09
- **6/15000+**, National Civil Engineering Olympiad, Iran Jul'08
- **1/500000+**, National non-profit college entrance exam, Iran Jun'04

Publications:

1. Asghar Aryanfar, S. Medlej, A. Tarhini, S. R. Damadi, A. R. Tehrani, W. A. Goddard III: *3D percolation modeling for predicting the thermal conductivity of graphene-polymer composites*: **Computational Materials Science (Q1)** - 97, 110650. **2021**

2. Asghar Aryanfar, I. Sanal, J. Marian: *Percolation-Based Image Processing for the Plastic Viscosity of Cementitious Mortar with Super Absorbent Polymer*: **Int J Concrete Structures and Materials (Q1)** - 15(25). **2021**

3. Asghar Aryanfar, Y. Ghamlouche, W. A. Goddard III: *Real-time Control of Dendritic Propagation in Rechargeable Batteries using Adaptive Pulse Relaxation*: **J Chemical Physics (Q1)** - 154, 194702. **2021**

4. Asghar Aryanfar, S. Medlej, A. Tarhini, A. Tehrani : *Elliptic Percolation Model for Predicting the Electrical Conductivity of Graphene-Polymer Composites*: **Soft Matter (Q1)** - 17, 2081 **2021**

5. Asghar Aryanfar, D. M. Saad, W. A. Goddard III: *A Novel Method for Estimating the Charge Equilibrium within the Dendrites of Rechargeable Batteries*: **Computational Materials Science (Q1)** - 187, 110059 **2021**

6. Asghar Aryanfar, S. Medlej, W. A. Goddard III: *Morphometry of dendritic materials in Rechargeable Batteries*: **J Power Sources (Q1)** - 481, 228914 **2021**

7. Asghar Aryanfar, Y. Ghamlouche, W. A. Goddard III: *Pulse-Reverse Protocol for Efficient Suppression of Dendritic Micro-structures in Rechargeable Batteries*: **Electrochimica Acta (Q1)** - 367, 137469 **2021**

8. Asghar Aryanfar, I. Sanal, J. Marian: *Novel Percolation-based Measure for Fibre Efficacy in fiber-reincored concrete Beams*: ***Structural Concrete* (Q1)** - 22(1), 264-272 **2021**

9. Asghar Aryanfar, M. R. Hoffmann, W. A. Goddard III : *Finite pulse waves for efficient suppression of evolving mesoscale dendrites in rechargeable batteries*: **Physical Review E (Q1)** - 2019, 100, 042801 **2019**

10. Asghar Aryanfar, W. A. Goddard III, J. Marian: *Constriction Percolation Model for Coupled Diffusion-Reaction Corrosion of Zr in PWR*: **Corrosion Science (Q1)**, 158, 108058 **2019**

11. M. Reyes. Asghar Aryanfar, S. W. Baek, J. Marian: *Multilayer interface tracking model of zirconium clad oxidation*: **J Nuclear Materials (Q1)**, 509, 550-565. **2018**

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

13. 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 (Q1)**, 114 (1), 57 **2017**

14. 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*: **J Metals Minerals & Materials (Q1)**, 47, 1543-1851. **2016**

15. L. M. Kasmaee, Asghar Aryanfar, Z. Chikneyan, M.R. Hoffmann, A. J. Colussi: *Improving solid-electrolyte interfaces via underpoetential solvent electropolymerization*: **Chemical Physics Letters (Q1)**, 661, 65. **2016**

16. 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 (Q1)** - 143, 134701. **2015**

17. 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 (Q1)** - 17, 8000. **2015**

18. 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 Letters (Q1)**, 5(10), 1721. **2014**

19. 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 (Q1)**, 16, 24965. **2014**

20. 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 Sci & Tech (Q1)** - 48(4), 2377. **2014**

Conference Papers:

1. **A. Aryanfar** et al: *Image Processing for Workability of Concrete with Super Absorbent Polymer,* Int Conf in Intelligent Decision Science, Springer, Cham, 681. **2020**

2. **A. Aryanfar** et al: *Bulk properties of amorphous lithium dendrites*, ECS Trans. 80 (10), 365 **2017**

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

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

Book Chapter:

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

Patents:

• **Asghar Aryanfar**: *Method and device for dendrite research and discovery in batteries*, US Patent 14/201, 979. **2017**

• M.R. Hoffmann, **Asghar Aryanfar**, C. Cid, K. Cho, D. J. Kwon, Y. Qu:*Self-contained PV-powered Toilet and Domestic Wastewater Disinfection System*, US Patent14/048, 163. **2014**

Invited Talks:

•MRS Fall meeting (Session Chair)	Nov'21	• ECS Conference, Spring 2021	May'21
• MRS Conference, Spring 2021	Apr'21	• ICAPP 2016, San Francisco, CA	May'16
• American University of Beirut	May'19	• MIT, Cambridge, MA	Jul'15
• Tesla Corporation, Palo Alto, CA	Apr'16	• MRS, San Francisco, CA	Apr'15
• EPFL, Lausanne, Switzerland	May'16	• ECS, Orlando, FL	May'14
• ECS, National Harbor, MD	Oct'17	• Sharif U of Tech, Tehran, Iran	Mar'14
• ECS, Chicago, IL	May'15	• ECS, Honolulu, HI	Oct'12
• MIT, Cambridge, MA	Dec'14	• MRS, San Francisco, CA	Apr '14

Reviewer Activities:

• Physical Review E	• Chemical Reviews	• Chemical Society Reviews
• J Materials Chem A	• J Electrochemical Society	• J Fluid Mechanics
• ECS Electrochemistry Letters	• Physics of Fluids (x2)	

Teaching Experience:

• Mech. Eng. Design	Sp'17,'18, Sp'20,'21	• Thermodynamics	Fa'16, Sp'18, Fa'21
• Finite Element Methods	Fa'18	• Vehicle Aerodynamics	Fa'18
• Transport Phenomena	Fa'17	• Fluid Mech & heat transfer	Sp'17, Sp'18
• Mech of Materials	Fa'16, Fa'17, Fa'20	• Mechanics of Materials	Fa'10
• Statics and Dynamics	Fa'11, Fa'20, Fa'21	• Hydraulics	Fa'07
• Structural Loading	Fa'06	• Tutoring Science/Eng.	'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 (Numpy, Matplotlib, Pandas, Tensor Flow, Scipy, Scikit Learn), Matlab, SolidWorks (design and simulation), AutoCAD, Photoshop, LaTeX

Memberships:

Materials Research Society (MRS), Electrochemical Society (ECS), ASME, ASCE, Caltech Alumni Association

Languages:

Azerbaijani (native) Persian English Turkish

References:

1. Prof. William A. Goddard (NAS)
Professor of Chemistry and Mat Sci and Appl. Phys.
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2. Prof. Michael R. Hoffmann (NAE)
Professor of Environmental Sciences
204 Linde-Robinson Lab, Caltech
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3. Prof. Jaime Marian
Professor (Vice Chair of Grad. Education)
3121D, Engineering V, UCLA
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4. Dr. Boris Merinov
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