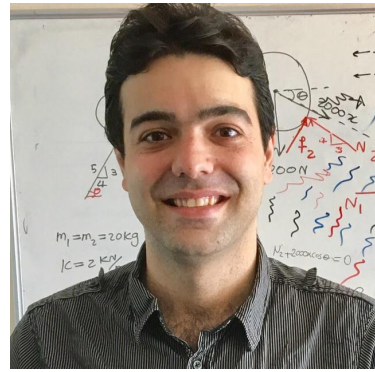




Asghar Aryanfar, PhD



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

- Assistant Professor, Mechanical Engineering Web: aaryanfar.github.io
-  Bogazici University [map] Google Scholar Profile: [link]
- Bebek, Istanbul, Turkey 34342 Skype: [asghararyanfar](https://www.skype.com/people/asghararyanfar)
- Visiting Associate, Chemical Engineering Email: asghar.aryanfar@bogazici.edu.tr
-  California Institute of Technology [map] Office / WAB: +90-212-359-7195 / +1-626-344-9750

Citizenships:

- USA 
-  Iran

Education:

- **PhD** in Mechanical Engineering, California Institute of Technology, Pasadena, CA Jun'10-Jun'15
Co-Advisors: Michael R. Hoffmann (NAE) [link], William A. Goddard III (NAS) [link]
- **MSc** in Mechanical Engineering, California Institute of Technology, Pasadena, CA Sep'09-Jun'10
- **BSc** in Mechanical Engineering (**top 5%**), Sharif University of Technology, Tehran, Iran Sep'05-Jun'09
- **BSc** in Civil Eng (**top 2%**), Sharif University of Technology, Tehran, Iran Sep'04-Jun'08

Employments:

- Assistant Professor, Mechanical Engineering, Bogazici University, Istanbul, Turkey Mar'23 - Present
- Assistant Professor, Mechanical Engineering, American University of Beirut, Lebanon Sep'19 - Feb'23
- Lecturer, Mechatronics Eng, Bahçeşehir University, Istanbul, Turkey Sep'16 - Aug'19
- 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

Current Team:

Students: Goktug Cinar (PhD) | [Seif Qiblawi](#) (ME) | Maria Khoury (ME) | Fadi Elias (ME) | [Abdelrahman El Tallis](#) (CE) | [Trina Dhara](#) (ChE) | [Mahmoud Yamani](#) (CS) | [Ali Tayyar](#) (ME) | [Leatithia Zeitouny](#) (ME).

Collaborators (3): [William A. Goddard III](#) | [Irem {S}anal](#) | [Jaime Marian](#).

Awards:

- Masri Institute Award: \$50K May'20
- University Research Board Research Grant: \$30K Apr'20
- OSM 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
- **2/110**, Civil Engineering Class, Sharif U of Tech, Tehran, Iran Sep'04 - Jun'08
- **5/120**, Mechanical Engineering Class, Sharif U of Tech, Tehran, Iran Sep'05 - Jun'09
- **6/15000+**, National Civil Engineering Olympiad, Iran Jul'08
- **78/500000+**, National governmental college entrance exam, Iran Jun'04
- **1/500000+**, National non-profit college entrance exam, Iran (exempted from military service) Jun'04

Publications :

- **Asghar Aryanfar**, F. Elias W.A. Goddard III **2024**
Enhancing the Thermal Dissipation in Batteries via Inclusion of Central Heat Sink
J ELECTROCHEM ENERGY CONV & STORAGE 21(2): <https://doi.org/10.1115/1.4062712>
- **Asghar Aryanfar**, A. Tayyar, W.A. Goddard III **2023**
Dendritic propagation on circular electrodes: The impact of curvature on the packing density
PHYSICAL REVIEW E 108(1), 014801: <https://doi.org/10.1103/PhysRevE.108.014801>
- **Asghar Aryanfar**, M. Khoury, I Şanal, D Şeyhibrahim, J Marian **2023**
Acquiring the size distributions of the aggregates using percolation modeling
CONSTRUCTION & BUILDING MAT, 379, 131109: <https://doi.org/10.1016/j.conbuildmat.2023.131109>
- **Asghar Aryanfar**, T Dhara, A. Ghosh, U. Ghosh, P. Mukherjee, S. DasGupta **2023**
The Role of Pulse Duty Cycle and Frequency on Dendritic Compression
JOURNAL OF PHYSICAL CHEMISTRY C.,127, 9, 4407–4415: <https://doi.org/10.1021/acs.jpcc.2c08066>
- **Asghar Aryanfar**, M. El Skafi, J. Marian **2023**
Governing Failure Mechanisms of three-way Dendritic Branches under Compressive Load
MECHANICS OF MATERIALS 80, 104620: <https://doi.org/10.1016/j.mechmat.2023.104620>
- **Asghar Aryanfar**, A. El Tallis, J. Marian **2023**
Coupling the Corrosion- and Pressure-Assisted Stress Buildup within the Zirconium in PWR Pipes
J MINETALS METALS AND MAT (JOM) 75 (1), 120-131: <https://doi.org/10.1007/s11837-022-05503-w>
- **Asghar Aryanfar**, M El Skafi, W A Goddard III **2022**
An Estimation for the Effective Force Transfer Medium in Radial Loading of the Cylindrical and Spherical Geometries: J MECH SCIENCE & TECH: 36 (12), 6171-6180: <https://doi.org/10.1007/s12206-022-1131-5>
- **Asghar Aryanfar** **2022**

J ELECTROCHEMICAL SOCIETY 169 (11), 112507: <https://doi.org/10.1149/1945-7111/ac9d6a>

- **Asghar Aryanfar**, Y. Ghamlouche, W. A. Goddard III **2022**
Optimized Pulse Form for the Extreme Inhibition of Growing Microstructures during Electrodeposition
MRS BULLETIN, 47 (7), 665-674: <https://doi.org/10.1557/s43577-022-00307-4>
- **Asghar Aryanfar**, J. Jundi, S. R. Damadi, W. A. Goddard **2022**
Real-time Interface-Tracking Framework for the Evolution of the Phases during the Quenching of Steel Balls: MATERIALIA, 21, 101327: <https://doi.org/10.1016/j.mtla.2022.101327>
- **Asghar Aryanfar**, S. Medlej, A. Tarhini, S. R. Damadi, A. R. Tehrani, W. A. Goddard III **2021**
3D percolation modeling for predicting the thermal conductivity of graphene-polymer composites
COMPUTATIONAL MATERIALS SCIENCE, 97, 110650: <https://doi.org/10.1016/j.commatsci.2021.110650>
- **Asghar Aryanfar**, I. Sanal, J. Marian **2021**
Percolation-Based Image Processing for the Plastic Viscosity of Cementitious Mortar with Super Absorbent Polymer: INT J CONCRETE STRUCTURES & MAT 15(25): <https://doi.org/10.1186/s40069-021-00462-z>
- **Asghar Aryanfar**, Y. Ghamlouche, W. Goddard III **2021**
Real-time Control of Dendritic Propagation in Rechargeable Batteries using Adaptive Pulse Relaxation
J CHEMICAL PHYSICS: 154,194702: <https://doi.org/10.1063/5.0042226>.
- **Asghar Aryanfar**, S. Medlej, A. Tarhini, A. Tehrani **2021**
Elliptic Percolation Model for Predicting the Electrical Conductivity of Graphene-Polymer Composites
SOFT MATTER - 17, 2081: <https://doi.org/10.1039/D0SM01950J>
- **Asghar Aryanfar**, D. M. Saad, W. A. Goddard III **2021**
A Novel Method for Estimating the Charge Equilibrium within the Dendrites of Rechargeable Batteries
COMPUTATIONAL MATERIALS SCIENCE-187, 110059: <https://doi.org/10.1016/j.commatsci.2020.110059>
- **Asghar Aryanfar**, S. Medlej, W. A. Goddard III **2021**
Morphometry of dendritic materials in Rechargeable Batteries
J POWER SOURCES - 481, 228914: <https://doi.org/10.1016/j.jpowsour.2020.228914>
- **Asghar Aryanfar**, Y. Ghamlouche, W. A. Goddard III **2021**
Pulse-Reverse Protocol for Efficient Suppression of Dendritic Micro-structures in Rechargeable Batteries
ELECTROCHIMICA ACTA - 367, 137469: <https://doi.org/10.1016/j.electacta.2020.137469>
- **Asghar Aryanfar**, I. Sanal, J. Marian **2021**
Novel Percolation-based Measure for Fibre Efficacy in fiber-reinforced concrete beams
STRUCTURAL CONCRETE - 22(1), 264-272: <https://doi.org/10.1002/suco.201900362>
- **Asghar Aryanfar**, M. R. Hoffmann, W. A. Goddard **2019**
Finite-pulse waves for efficient suppression of evolving mesoscale dendrites in rechargeable batteries
PHYSICAL REVIEW E, 100, 042801: <https://doi.org/10.1103/PhysRevE.100.042801>

- **Asghar Aryanfar**, W. A. Goddard III, J. Marian 2019
Constriction Percolation Model for Coupled Diffusion-Reaction Corrosion of Zr in PWR
CORROSION SCIENCE - 158, 108058: <https://doi.org/10.1016/j.corsci.2019.06.013>
- M. Reyes, **Asghar Aryanfar**, S. W. Baek, J. Marian 2018
Multilayer interface tracking model of zirconium clad oxidation
J NUCLEAR MATERIALS, 509, 550-565: <https://doi.org/10.1016/j.jnucmat.2018.07.025>
- **Asghar Aryanfar**, D.J. Brooks, W. A. Goddard III 2018
Theoretical pulse charge for optimal inhibition of growing dendrites
MRS ADVANCES, 1, 1-7: <https://doi.org/10.1557/adv.2018.97>
- C. Xu, Z. Ahmad, **Asghar Aryanfar**, V. Viswanathan, J. R. Greer 2017
Enhanced strength and temperature dependence of mechanical properties of Li at small scales and its implications for Li metal anodes: PNAS , 114 (1), 57: <https://doi.org/10.1073/pnas.1615733114>
- **Asghar Aryanfar**, J. Thomas, A. VanderVen, D. Xu, M. Youssef, J. Yang, B. Yildiz, J. Marian 2016
Integrated computational modeling of water-side corrosion in zirconium metal clad under nominal LWR operating conditions: JOM, 47, 1543-1851: <https://doi.org/10.1007/s11837-016-2129-1>
- L. M. Kasmaee, **Asghar Aryanfar**, Z. Chikneyan, M.R. Hoffmann, A. J. Colussi 2016
Improving solid-electrolyte interfaces via underpotential solvent electropolymerization
CHEMICAL PHYSICS LETTERS, 661, 65: <https://doi.org/10.1016/j.cplett.2016.08.045>
- **Asghar Aryanfar**, T. Cheng, , A. Colussi, B. Merinov, W. Goddard, M. Hoffmann 2015
Annealing kinetics of electrodeposited lithium dendrites
J CHEMICAL PHYSICS - 143, 134701: <https://doi.org/10.1063/1.4930014>
- **Asghar Aryanfar**, D. Brooks, B. Merinov, A. Colussi, W. Goddard, M. Hoffmann 2015
Thermal relaxation of lithium dendrites
PHYS CHEM CHEM PHSYS- 17, 8000: <https://doi.org/10.1039/C4CP05786D>
- **Asghar Aryanfar**, D. J. Brooks, A. J. Colussi, M. R. Hoffmann 2014
Quantifying the Dependence of Dead Lithium Crystals on Cycling Period in Lithium Metal Batteries
PHYS CHEM CHEM PHSYS, 16, 24965: <https://doi.org/10.1039/C4CP03590A>
- **Asghar Aryanfar**, D. Brooks, B. Merinov, W. A. Goddard, A. J. Colussi, M. R. Hoffmann 2014
Dynamics of lithium dendrite growth and inhibition: pulse charging experiments and monte carlo calculations: J PHYS CHEM LETT, 5(10), 1721: <https://doi.org/10.1021/jz500207a>
- K. Cho, Y Qu, D. Kwon, H. Zhang, C. Cid, **Asghar Aryanfar**, M. R. Hoffmann 2014
Effects of anodic potential and chloride ion on overall reactivity in semiconductor electrochemical reactors: ENV SCI & TECH - 48(4), 2377: <https://doi.org/10.1021/es404137u>

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 Patent 14/048, 163. **2014**

Invited Talks:

- | | | | |
|---|--------|----------------------------------|---------|
| • MRS Fall meeting (<i>Session Chair</i>) | Dec'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) | • J Alloys and Compounds |
| • Mechanics of Adv Mat & Structures | | |

Teaching Experience:

- | | | | |
|--------------------------|---------------|------------------------------|-------------------------|
| • Manufacturing Tech | S23, S24 | • Mech. Design | S17, S18, S20, S21, S22 |
| • Finite Element Methods | F18 | • Vehicle Aerodynamics | F18 |
| • Transport Phenomena | F17 | • Fluid Mech & heat transfer | S17, S18 |
| • Mech of Materials | F16, F17, F20 | • Mechanics of Materials | F10 |
| • Statics and Dynamics | F11, F20, F21 | • Hydraulics | F07 |
| • Structural Loading | F06 | • Thermodynamics | F16, S18, F21 |
| • Computer Vision | F22 | | |

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 FEA), AutoCAD, Photoshop, L^AT_EX

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.
321 Beckman Institute, Caltech
wag@caltech.edu
626-395-3093
2. Prof. Michael R. Hoffmann (NAE)
Professor of Environmental Sciences
204 Linde-Robinson Lab, Caltech
mrh@caltech.edu
626-395-4391
3. Prof. Jaime Marian
Professor (Vice Chair of Grad. Education)
3121D, Engineering V, UCLA
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310-206-9161

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