HALEH ARDEBILI

Texas Center for Superconductivity
University of Houston Science Center
3201 Cullen, Suite 202
Houston, Texas 77004
Phone:(713) 743-8200

Department: Mechanical Engineering
College: Engineering
Address: N223 Engineering Building One
Houston, TX, 77204-4006
Phone: (713) 743-5562; Fax: (713) 743-4503
E-mail: hardebili@uh.edu

Education:

B.S. Honors	Penn State University at University Park, PA	1990-1994
M.S.	Johns Hopkins University, Baltimore, MD	1994-1996
Ph.D.	University of Maryland at College Park, MD	1996-2001
	PhD Advisor: Michael Pecht; MS Advisor: Gregory Chirikjian	

Employment History:

Associate Professor, University of Houston	Sep 2016 – present
Assistant Professor, University of Houston	Sep 2010 – Aug 2016
Postdoctoral Research Fellow, Rice University	2009 - 2010
Lecturer, University of Houston	2004 - 2010
Research Scientist, General Electric R&D at Niskayuna	2000 - 2003

Honors and Awards:

- W.T. Kittinger Teaching Excellence Award (2017)
- Texas Space Grant Consortium New Investigators Award (2014)
- NSF CAREER Award (2013-2018)
- Bill D. Cook Professorship Award (2013)
- Cullen College of Engineering Outstanding Teacher Award (2013)
- New Faculty Award (2010)
- Invention Fulcrum of Progress-General Electric Award to Inventors, 2003
- Women in Science Award from Saint John's University, NY, 1988

Recent Research Highlights:

- Designed and fabricated spiral stretchable Li-ion batteries capable of large out-of-plane tensile deformation up to 1300%.
- The spiral lithium ion battery exhibits robust mechanical stretchability over 9000 stretching cycles and an energy density of 4.862 mWh/cm^3 at about 650 % out-of-plane deformation.
- Experimentally and theoretically investigated the effects of extreme mechanical bending on the interfacial properties of the battery including interfacial contact pressure and conductance.
- Bending and contact properties significantly influence the interfacial contact pressure that can be correlated with the battery interface conductance.
- Thermal modeling simulations and accelerated rate calorimetry (ARC) experiments were conducted to investigate thermal runaway in lithium ion batteries for space applications.
- Deformable Li ion battery was designed based on sliding electrodes and stretchable polymer electrolyte displaying enhancement in electrochemical properties as the battery is stretched.
- Investigated reversible liquid crystal elastomers (LCEs) with enhanced shape response, and observed that tailoring the length and composition of the linking group can reduce the glass-transition temperature with little impact on the liquid crystal order parameter, resulting in an LCE with shape-responsiveness near room temperature.

Lab Facilities / Expertise:

- ***Energy Storage:*** Dual Operator Glovebox, Autolab Electrochemical Analyzer with FRA impedance spectroscopy, Arbin Battery Testing Equipment with 96 total channels, vacuum ovens, chemical hood, sonicator, doctor blade coater, small-sized glovebox, laser cutter machine, hot press machine, 3D printing machine, RH/T controlled oven, superspeed centrifuge.
- ***Materials Characterization:*** Tensile Machine, Differential Scanning Calorimetry (DSC), Thermogravimetric Analyzer (TGA), Thermomechanical Analyzer (TMA), Dynamic Mechanical Analyzer (DMA), FTIR spectroscopy, polarized optical microscope.
- ***Modeling and Simulation:*** LAMMPS MD simulator, COMSOL

Five Selected Publications:

1. Kammoun, M., Berg, S., **Ardebili, H.**, Stretchable spiral thin-film battery capable of out-of-plane deformation, *Journal of Power Sources* 332, Nov 2016, 406-412.
2. Yayathi, S., Walker, W., Doughty, D., **Ardebili, H.**, Energy distributions exhibited during thermal runaway of commercial lithium ion batteries used for human spaceflight applications, *Journal of Power Sources* 329, October 2016, 197-206.
3. Berg, S., Akturk, A. Kammoun, M., **Ardebili, H.**, Flexible batteries under extreme bending: interfacial contact pressure and conductance, *Extreme Mechanics Letters*, Volume 13, May 2017, 108-115.
4. Zhu B, Barnes MG, Kim H, Yuan, M., **Ardebili, H.**, Verduzco, R., Molecular engineering of step-growth liquid crystal elastomers, *Sensors and Actuators* B: Chemical, June 2017, 244:433-40.
5. Kelly, T., Moradi Ghadi, B., Berg, S., **Ardebili, H.** "*In situ* study of strain-dependent ion conductivity of stretchable polyethylene oxide electrolyte", *Scientific Reports (Nature)* 6: 20128, 2016