

HaoTian Harvey Shi

Department of Mechanical &
Materials Engineering

Western University

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Ph.D., M.A.Sc, B.A.Sc., EIT

Profile

“Be Intrepid, Innovate and Never Stop”

Experience

Assistant Professor

Dept. Mechanical Engineering, Western University, London, Ontario, Canada, 2022 - Present
Development of data-driven advanced manufacturing
Research in the fields of energy storage and biomedical sensing
Director of the D2M (Data to Manufacturing) laboratory

Founder & CEO

Flexcap Energy Ltd., Toronto, Ontario, Canada, 2016 - Present
Innovation in flexible thin-film batteries for powering smart wearables and IoT devices
Secured \$1M seed funding for product commercialization and growth strategy
Led vital business operations with customers worldwide

Post-Doctoral Research Associate

Dept. of Engineering, University of Cambridge, Cambridge, United Kingdom, 2021 - 2022
3D printing technologies at multiple length-scales
Fiber functionalization for high performance breath sensors

Post-Doctoral Research Associate

Dept. Mechanical Engineering, University of Toronto, Toronto, Ontario, Canada, 2020 - 2021
Designed novel structures for anti-viral/covid-proof masks
Advanced printing method for printing graphene nanostructures
Adaptable electrodes for neuromodulation and stimulation

Sessional Instructor & Teaching Assistant

Dept. Mechanical Engineering, University of Toronto, Toronto, Ontario, Canada, 2017 - 2020
Coordinated 4th year course on Polymers and Composites Engineering for 60 students
Innovated in teaching methods for better learning
Teaching assistant for 8 different courses across a wide range of engineering fields

Systems/Hardware Platform Electrical Validation Engineering Intern

Advanced Micro Devices Inc. (AMD), Markham, Canada, 2012 – 2013
Electrical signal validation for graphic cards, gaming consoles, and CPUs
Automated data acquisition resulting in \$500,000 in annual savings

Co-Founder & Engineering Coordinator

Adaptation Public Research and Innovations Lab, 2012-2016
Lead in designing *Microbial Fuel Cells* and *Biological Desalination Technologies* Projects

Education

University of Toronto

Ph.D. in Mechanical Engineering June 2020
M.A.Sc. in Mechanical Engineering June 2016
B.A.Sc. in Engineering Science (Energy Systems) June 2014

Refereed Publications

- **Shi, H. H.**, Feng, X. M., Wang, W., Huang, Y. Y. S. (2022), '*Green' Human-Centric Smart Garment*, Under Review
- **Shi, H. H.**, Wang, W., Huang, Y. Y. S. (2022), Functional Fiber Design and Fabrication for E-Textiles, Review Article, Under Preparation
- Hong, S. H.*, **Shi, H. H.***, Wang, G. R., Filleter, T. & Naguib, H. E. (2022), Exceptionally Tough Fibrous Gel-Elastomer Composite Material for Smart Skin. Under Preparation.
- **Shi, H. H.***, Hong, S. H.*, Naguib, H. E. (2022), Direct-Writing of Multi-functional Photo-Reduced Graphene Oxide Fabric (rGO_f) at the Liquid-Air Interface with Tuneable Porosity. *Advanced Materials Technologies*, Accepted. (admt.202200148)
- **Shi, H. H.***, Hong, S. H.* & Naguib, H. E. (2022), Self-Assembled Polypyrrole Micro-Foam/Carbon Nanotube Composite for Flexible Electrochemical Capacitor Electrodes. *ACS Applied Energy Materials*, 5(4), 4059-4069.
- Taromsaria, S., **Shi, H. H.**, Saadatniaa, Z., Park, C.B., & Naguib, H. E. (2021), An Ultra-sensitive, Highly Stable Strain Sensor Based on Electrospun SBS and Nanohybrid MXene-Graphene-CNC Decoration with Enhanced Interfacial Properties, *Chemical Engineering Journal*, 442(2), 136138
- Li, T., Chen, T., Shen, X., **Shi, H. H.**, Jabari, E., & Naguib, H. E. (2022). A binder jet 3D printed MXene composite for strain sensing and energy storage application. *Nanoscale Advances*, 4, 916-925
- Macadam, N., Ng, L. W., Hu, G., **Shi, H. H.**, Wang, W., Zhu, X., ... & Hasan, T. (2021). 100 m min⁻¹ Industrial-Scale Flexographic Printing of Graphene-Incorporated Conductive Ink. *Advanced Engineering Materials*, 2101217.
- Gerigk, M., Bulstrode H., **Shi, H. H.**, Tönisen, F., Cerutti C., Morrison G., Rowitch D., Huang, Y. Y. S. (2021), On-chip perivascular niche with patient derived glioma cells for genotypic and phenotypic analysis. *Lab-on-a-Chip*, 21(12), 2343-2358. Backcover Article.
- **Shi, H. H.***, Iwasa, S. N.*, Hong, S. H.*, Chen T., Marquez-Chin, M., Iorio-Morin C., Kalia S. K., Popovic M.R., Naguib H. E., Morshead C. M. (2020), *Novel Electrode Designs for Neurostimulation for Regenerative Medicine – Stimulating Stem Cells*, *Bioelectricity*, 2(4), 348-361.
- **Shi, H. H.**, Jang, S., Reza Ugalde, A., & Naguib, H. E. (2020). Hierarchically Structured Nitrogen-Doped Multi-Layer Reduced Graphene Oxide for Flexible Intercalated Supercapacitor Electrodes. *ACS Applied Energy Materials*, 3(1), 987-997.
- **Shi, H. H.** & Naguib, H. E. (2019). Freestanding Laser-assisted Reduced Graphene Oxide Microribbon Textile Electrode Fabricated on a Liquid Surface for Supercapacitor and Breath Sensors, *ACS Applied Materials & Interfaces*, 11(30), 27183-27191.
- **Shi, H. H.**, Khalili, N., Morrison, T., & Naguib, H. E. (2018). Self-Assembled Nanorod Structures on Nanofibers for Textile Electrochemical Capacitor Electrodes with Intrinsic Tactile Sensing Capabilities. *ACS Applied Materials & Interfaces*, 10(22), 19037-19046.
- **Shi, H. H.**, & Naguib, H. E. (2016). Highly flexible core-shell nanofibrous electrode for lightweight electrochemical energy storage using recycled water bottles. *Nanotechnology*, 27(32), 325402.

- Yousaf, M., **Shi, H. H.**, Wang, Y., Chen, Y., Ma, Z., Cao, A., Naguib, H. E. & Han, R. P. (2016). Novel pliable electrodes for flexible electrochemical energy storage devices: recent progress and challenges. *Advanced Energy Materials*, 6(17). Cover Page Article.
- Lee, K. Y.; **Shi, H. H.**; Lian, K, Naguib, H. E., (2015) Flexible Multiwalled Carbon Nanotubes/ Conductive Polymer Composite Electrode for Supercapacitor Applications, *Smart Materials and Structures*, 24(11), 115008.
- Leung, S. N., Khan, O. M., **Shi, H. H.**, Naguib, H. E., Dawson, F., & Adinkrah, V. Study on liquid crystal polymer-hexagonal boron nitride composites for hybrid heat sinks. *Industrial & Engineering Chemistry Research*, 52(24), 8332-8339

Patents

- *Hydrocarbon Leak Detection System and Method for Pipelines*, TAILOR, Dilip; WONG, Dennis; DUNN, Ronald J.; KHALILI, Nazanin; NAGUIB, Hani; BRANDON, Mark Phillip; SESHADRI, Akshay; **SHI, HaoTian**; BENINCA, Miriam Rafaela; ELLIS, Jeremy Joseph; CA PCT/CA2018/051100, WO/2019/046961, Shawcor Ltd. Toronto, Ontario, Canada

Conference Contributions

- **Shi, H. H.** & Naguib, H. E. (2022). *Hierarchically structured multi-layer composite electrode for flexible intercalated supercapacitors*, International Conference on Composite Materials (ICCM23 Paper No. 378), Belfast, Northern Ireland, U.K.
- **Shi, H. H.** & Naguib, H. E. (2021). Self-Assembly of Polypyrrole Micro-foam/Carbon Nanotube Composite Electrodes for Stretchable Self-Sensing Supercapacitor Devices, Materials Research Society (MRS Paper ID 3501899), Held Remotely
- **Shi, H. H.**, Khalili, N., Naguib, H. E. (2019). Multifunctional high-performance textile electrochemical capacitor electrodes with tactile sensing capabilities, International Conference on Multifunctional, Hybrid and Nanomaterials (HYMA2019 P2.064), Materials Today (Elsevier), Sitges, Spain
- **Shi, H. H.** & Naguib, H. E. (2017). Surface-Modified Electrospun Nanofibers Fabricated via Ultrasonic In-Situ Spray Coating of Carbon Nanoparticles for Flexible Electrochemical Capacitor Electrodes, Materials Research Society (MRS Paper No. ES04.02.03), Boston, Massachusetts, USA
- **Shi, H. H.** & Naguib, H. E. (2016). *Novel Fabrication Route for a Lightweight, Low Vapour Permeable Packaging Suited for Flexible Energy Storage Applications*, Smart Materials, Adaptive Structures and Intelligent Systems Conference (SMASIS Paper No. 2016-9345), ASME, Stowe, Vermont, USA
- **Shi, H. H.** & Naguib, H. E. (2016). *Layered Conductive Polymer on Nylon Membrane Templates for High Performance, Thin-Film Supercapacitor Electrodes*, Smart Structures and Materials (SPIE Paper No. 9800-19). International Society for Optics and Photonics, Las Vegas, Nevada, USA
- **Shi, H. H.** & Naguib, H. E. (2015). Fabrication and characterization of polyaniline-graphene nanoplatelets composite electrode materials for hybrid supercapacitor applications. Smart Structures and Materials (SPIE Paper No. 94320U). International Society for Optics, San Diego, USA
- **Shi H. H.**, Dumas J., Bonnevide M., Naguib H. E. (2015), A Study on the Effect of Twin-Screw Melt Blended Nano-Fillers on Polypropylene Nanocomposite Hybrid Electrical and Morphological Properties for Supercapacitor Applications, Society of Plastics Engineers (SPE) Annual Technical Conference ANTEC (Paper No. 2097479), Cleveland, Ohio, USA