WU ZHANG

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EDUCATION AND TRAINING

Doctor of Philosophy	Engineering, University of Alberta, Canada -Photonics and Plasmas	2020 - 2024
Master of Science	Engineering, University of Alberta, Canada	2017 - 2020
Bachelor of Science	Engineering, University of Alberta, Canada	2012 – 2017

WORK EXPERIENCE

Postdoctoral Researcher
The Research Group of Dr. Delia Milliron — July 2024 – Present
University of Texas at Austin, Austin, Texas, US

- Lead the project of electrochromic materials and device development
- Generate creative ideas.
- Synthesize electrochromic materials and conduct electrochemical experiments
- Assemble electrochromic smart devices and test devices for various applications
- Complete data analysis and write reports

Graduate Research Assistant
The Research Group of Dr. Abdulhakem Y. Elezzabi — September 2017 – June 2024
University of Alberta, Edmonton, Alberta, Canada

- Generate creative ideas.
- Nanoscale fabrication of smart devices in NanoFAB(UA).
  Equipment: Sputtering machine, Spectrophotometer UV/VIS (Hitachi U-3900H), Spectrophotometer (Perkin-Elmer NIR-UV), Zeiss Sigma FESEM, Hitachi S-4800 FESEM, FTIR-iS50, RAITH 150 Electron Beam Lithography
- Conduct electrochemistry experiments in Chem lab.
  Equipment: Zahner electrochemical workstation (Zennium CIMPS-1), helium-neon laser (632.8 nm), Ocean Optics USB4000 spectrometer
- Complete data analysis on Excel, OriginLab and Matlab
- Make graphical representations in Blender, Adobe Illustrator and Adobe Photoshop
- Write journal papers, conference presentations and peer-review of manuscripts (reviewer)

PROJECT EXPERIENCE

Terahertz to Mid-Infrared Compact Photonic Platform on Scalable Semiconductor Technology **2019-2024**

Displays act as a vital role in smart devices. A wide color gamut distribution has long been sought after for non-emissive display technologies. Our group developed a new technology of transparent displays which is able to provide 2D CIE (International Commission on Illumination) color space tunability (Light Sci. Appl., 2020, 9, 121; Adv. Funct. Mater., 2022, 32, 202108341). As a result, such a device does not require a costly nanofabrication of RGB (red, green, blue) subpixels. Our work has been widely reported by the American Association for the Advancement of Science (AAAS), Phys.org, Laser Focus World and China Optics.

Link: https://www.eurekalert.org/news-releases/801293;
https://phys.org/news/2020-07-transparent-inorganic-multicolour-enabled-zinc-based.html.
https://mp.weixin.qq.com/s/k90KnCtIEG4W_p5CLZXFjg

Development of Nano-Based Platform for Smart Windows and Energy Storage 2017-2023

Smart windows with reversible transmittance change offer great potential for simultaneously improving building energy efficiency and human wellness. It could also be widely applied in automobiles, airplanes and optical-electronic devices. Our group developed a new class of smart windows that controls light intensity and at the same time act as a rechargeable battery for electrical energy storage (Adv. Funct. Mater., 2023, 12, 2300155; Adv. Mater., 2020, 32, 2003574; Adv. Opt. Mater., 2020, 8, 1901224). This technology has opened up unique opportunities for large-scale, high energy-efficiency and low-cost smart windows. This project is supported by the Natural Sciences and Engineering Research Council of Canada (Grant File No: CRDPJ 509210-17), Alberta Innovates, and All Weather Windows Ltd.

PUBLICATIONS

(**Google Scholar**: https://scholar.google.com/citations?user=Aq2JbQgAAAAJ&hl=en)

1. **Zhang, W**.; Li, H.; Elezzabi, A. Y. "Dynamic windows with spectral-selectively modulation of solar heat and light", Under Review.
2. Liu, P.; Wang, B.; Wang, C.; Ma, L.; **Zhang, W.**; Hopmann, E.; Liu L.; Elezzabi, A.Y.; Li, H. "Amorphous Tungsten Oxide Nanodots for Chromatic Applications", *Advanced Functional Materials*, 2400760, 2024.
3. Zhao, F.; Wang, B.; **Zhang, W.**; Cao, S.; Liu, L.; Elezzabi, A. Y.; Li, H.; Yu, W. W. "Counterbalancing the interplay between electrochromism and energy storage for efficient electrochromic devices." *Materials Today*, 66, 431-447, 2023.
4. **Zhang, W**.; Li, H.; Elezzabi, A. Y. "A dual-mode electrochromic platform integrating zinc anode-based and rocking-chair electrochromic devices", *Advanced Functional Materials*, 33, 2300155, 2023.
5. Hopmann, E**., Zhang, W.**, Li, H.; Elezzabi, A. Y. "Advances in electrochromic device technology through the exploitation of nanophotonic and nanoplasmonic effects", *Nanophotonics*, 12, 637-657, 2023.
6. **Zhang, W**.; Li, H.; Elezzabi, A. Y. "Manipulating silver adatoms for aqueous plasmonic electrochromic devices." *Advanced Materials Interfaces*, 9, 202200021 (2022).
7. Wang, B.; **Zhang W.**; Zhao, F.; Yu, W.; Elezzabi, A.Y.; Liu L.; Li, H. "An overview of recent progress in the development of flexible electrochromic devices", *Nano Materials Science*, 2022.
8. **Zhang, W**.; Li, H.; Elezzabi, A. Y. "Electrochromic displays having two-dimensional CIE color space tunability." *Advanced Functional Materials*, 32, 202108341 (2022).
9. Wang, K.; Meng, Q.; Wang, Q.; **Zhang W.**; Guo, J.; Cao, S.; Elezzabi, A.Y.; Yu, W.; Liu L.; Li, H., "Advances in Energy-Efficient Plasmonic Electrochromic Smart Windows Based on Metal Oxide Nanocrystals", *Advanced Energy and Sustainability Research*, 2, 2100117, 2021.
10. **Zhang, W**.; Li, H.; Yu, W. W.; Elezzabi, A. Y. "Emerging Zn anode-based electrochromic devices." *Small Science*, 1, 2100040 (2021).
11. **Zhang, W**.; Li, H.; Hopmann, E.; Elezzabi, A. Y. "Nanostructured inorganic electrochromic materials for light applications." *Nanophotonics*, 10, 825-850 (2021). (**ESI Highly Cited**)
12. Li, H.; **Zhang, W**.; Elezzabi, A. Y. "Transparent zinc-mesh electrodes for solar-charging electrochromic windows." *Advanced Materials*, 32, 2003574 (2020). (**ESI Highly Cited**)
13. **Zhang, W**.; Li, H.; Yu, W. W.; Elezzabi, A. Y. "Transparent inorganic multicolor displays enabled by zinc-based electrochromic devices." *Light: Science & Applications*, 9, 121 (2020). (**ESI Highly Cited**)
14. **Zhang, W**.; Li, H.; Al-Hussein, M.; Elezzabi, A. Y. "Electrochromic battery displays with energy retrieval functions using solution-processable vanadium oxide nanoparticles." *Advanced Optical Materials*, 8, 1901224 (2020).

15. **Zhang, W**.; Li, H.; Firby, C. J.; Al-Hussein, M.; Elezzabi, A. Y. "Oxygen-vacancy-tunable electrochemical properties of electrodeposited molybdenum oxide films." *ACS Applied Materials & Interfaces*, 11, 20378–20385 (2019).

CONFERENCE PRESENTATIONS

1. **Zhang, W**.; Li, H.; Elezzabi, A. Y.; Milliron, D. J. "Zinc anode-based electrochromic devices", 15th International Meeting on Electrochromism (IME-15), Caparica, Portugal, September 02-06, 2024.
2. **Zhang, W**.; Li, H.; Elezzabi, A. Y. "Zinc anode-based electrochromic devices", 2023 MRS Spring Meeting & Exhibit, Symposium EL03 Frontiers in Electrochromic Materials and Devices, San Francisco, California, United States, April 10-14, 2023.
3. **Zhang, W.**; Li, H.; Elezzabi, A. Y. "Nanoscale manipulating plasmonic silver adatoms for dynamic light modulation." *Ultrafast Phenomena and Nanophotonics XXVII*, San Francisco, California, United States, 12419, 74-80, 2023. (Invited Speaker)
4. **Zhang, W.**; Li, H.; Elezzabi, A. Y., "Zinc anode-based electrochromic devices for dynamic light modulation." *Oxide-based Materials and Devices XIV*, San Francisco, California, United States, 12422, 99-105, 2023.
5. **Zhang, W**.; Li, H.; Elezzabi, A. Y. "Emerging Zn anode-based electrochromic devices." *23rd International Conference on Solid State Ionics (SSI-23)*, Boston Park Plaza, Boston, July 17-22, 2022. (Invited Speaker)

PEER REVIEW EXPERIENCES

- Advanced Functional Materials (3)
- Advanced Energy Materials (1)
- Advanced Optical Materials (2)
- Laser & Photonics Reviews (2)
- Small (2)
- Nano-Micro Letters (1)
- Advanced Materials Interfaces (2)

SOFTWARE SKILLS

- Engineering Software: Lumerical, Klayout, Blender, Matlab, Originlab
- General software: Microsoft Office (particularly Access, Excel, Word, PowerPoint, and Visio), Adobe Photoshop, Adobe Illustrator