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Osama Awadallah, Ph.D., M.Sc.

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Professional Profile

Dr. Awadallah has a background in materials science and engineering. His main consulting area is energy generation and storage systems, including batteries, fuel cells, and photovoltaic solar cells. Dr. Awadallah has experience in advanced electrode fabrication for energy devices, especially in lithium-ion batteries which find applications in electric vehicles (EV), consumer electronics, power tools, and medical devices. He has extensive experience in various electrochemical testing and failure analysis techniques including cyclic charge/discharge, cyclic voltammetry (CV), Electrochemical Impedance Spectroscopy (EIS), Linear Sweep Voltammetry (LSV), and Galvanostatic Intermittent Titration Test (GITT), etc. Dr. Awadallah has mastered a variety of materials characterization and testing techniques including microscopy: Optical microscopes (OM) & Scanning Electron microscopes (SEM), X-ray diffraction (XRD), Raman Spectroscopy, UV-VIS Spectroscopy, Thermogravimetric Analysis (TGA), metallographic examination, and mechanical testing.

Dr. Awadallah earned his Ph.D. in Materials Science and Engineering from Florida International University where he developed an advanced in-situ Raman spectroscopy system to study real-time changes in various energy materials. The in-situ Raman spectroscopy system was successfully used to investigate critical phase transformation and structural changes in Kesterite copper zinc tin sulfide (CZTS) quaternary material which finds applications in photovoltaic solar and Lead magnesium niobate which is used in ceramic capacitors and ultrasound transducers. Dr. Awadallah pursued his postdoctoral studies at FIU where he conducted research on electrode materials, electrolyte formulations, and scalable synthesis methods to develop high-energy-density lithium-ion and lithium-sulfur batteries for applications in EV.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Enginering, Florida International University, 2018

M.Sc., Mechanical Design and Production Engineering, Cairo University, 2013

B.Sc., Mechanical Design and Production Engineering, Cairo University, 2008

Prior Experience

Research Assistant Professor, Florida International University, 2022-2023

Postdoctoral Associate, Florida International University, 2019-2023

Lecturer, Cairo University, 2009-2022

Patents

WO/2022/159137: Solid-State Electrolyte for Improved Battery Performance, July 2022 (B.El-Zahab, O.Awadallah, D.Hamal).

Publications

O. Awadallah, Andriy Durygin, and Zhe Cheng “Unveiling the Phase Evolution of Sol-Gel Sulfurized Cu2ZnSnS4 Thin Films in ppm-Level H2S: From Binary Sulfides to Quaternary Cu-Zn-Sn-S System,” Journal of Electronic Materials, (2021).

Hooman Sabarou; Vadym Drozd, O. Awadallah; et al. “Structural investigation of oxygen stoichiometry during thermocycles in PMN-28PT,” Journal of Alloys and Compounds (2019).

O. Awadallah; Zhe Cheng. “Study of the fundamental phase formation mechanism of sol-gel sulfurized Cu2ZnSnS4 thin films using in situ Raman spectroscopy,” Solar Energy Materials and Solar Cells (2018).

Shichen Sun; O.Awadallah; Zhe Cheng. “Poisoning of Ni-Based anode for proton-conducting SOFC by H2S, CO2, and H2O as fuel contaminants,” Journal of Power Sources (2018).

O.Awadallah; Zhe Cheng. “Formation of sol-gel based CZTS thin films using ppm-level hydrogen sulfide gas,” Thin Solid Films (2017).

O.Awadallah; Joseph Hernandez; Andriy Durygin; Zhe Cheng. “In Situ Raman Monitoring of Kesterite Cu2ZnSnS4 Phase Formation from Sulfurization of Sol-gel Oxide Precursors,” Photovoltaics Specialist Conference (PVSC) proceedings, 2017 IEEE 44th (2017).

Phani Kiran Vabbina; Raju Sinha; Arash Ahmadivand; Mustafa Karabiyik; Burak Gerislioglu; O.Awadallah; and Nezih Pala. “Sonochemical Synthesis of a Zinc Oxide Core-Shell Nanorod Radial p–n Homojunction Ultraviolet Photodetector,” ACS Applied Materials and Interfaces (2017).

O.Awadallah; Zhe Cheng. “In Situ Raman Monitoring of Cu2ZnSnS4 Oxidation and Related Decomposition at Elevated Temperatures,” IEEE Journal of Photovoltaics (2016).

O.Awadallah; Zhe Cheng. “In situ Raman Characterization of Cu2ZnSnS4 Solar Absorber Materials,” Photovoltaics Specialist Conference (PVSC) proceedings, 2015 IEEE 42nd (2015).

Rashad, Ragaie; O.Awadallah; and Abdalla Wifi, “Effect of MWCNTs content on the characteristics of A356 Nanocomposite,” Journal of Achievements in Materials and Manufacturing Engineering, (2013).

O.Awadallah; Ragaie Rashad; and Abdalla Wifi, “Study of the effect of Anode/Cathode geometry on the yield rate and quality of the MWCNTs synthesized by Submerged arc discharging”, ASME 2013 International Manufacturing Science and Engineering Conference Proceedings, vol 55461, (2013).

Presentations

D. Hamal, O. Awadallah, B. El-Zahab. “Catalysis in Lithium-Sulfur Cathodes for Improved Performance and Stability” 242nd ECS Meeting, October 9-13, 2022, Atlanta, GA, USA.

G. Ghimire, A. Loganathan, O. Awadallah, B. El-Zahab “Sulfurized Electrolyte Additives for Stable Lithium Metal Anodes”, 242nd ECS Meeting, October 9-13, 2022, Atlanta, GA, USA.

A. Loganathan, G. Ghimire, D. Hamal, O. Awadallah, B. El-Zahab. “Metal Sulfide Artificial Solid-Electrolyte Interface for Lithium Anode Stability”, 242nd ECS Meeting, October 9-13, 2022, Atlanta, GA, USA.

A. Claus, A. Berkova, O. Awadallah, and B. El-Zahab. “Seawater Battery: Strategies to Enable High Performance”, 242nd ECS Meeting, October 9-13, 2022, Atlanta, GA, USA.

O. Awadallah; Zhe Cheng. “In Situ Raman Characterization of CZTS Phase Formation from Sulfurization of Sol-gel Oxide Precursors in ppm-level H2S-Containing Atmosphere”, Materials Science &Technology (MST) Fall Meeting 2017, Pittsburgh, PA, USA.

O. Awadallah; Zhe Cheng. “In Situ Raman Characterization of CZTS Phase Formation from Sulfurization of Sol-gel Oxide Precursors in ppm-level H2S-Containing Atmosphere”, Materials Science &Technology (MST) Fall Meeting 2017, Pittsburgh, PA, USA.

O. Awadallah; Joseph Hernandez; Andriy Durygin; Zhe Cheng. “In Situ Raman Monitoring of Kesterite Cu2ZnSnS4 Phase Formation from Sulfurization of Sol-gel Oxide Precursors,” Photovoltaics Specialist Conference (PVSC), 2017 IEEE 44th, Washington D.C., USA.

O. Awadallah; Zhe Cheng. “Complexity Involving Metallic Glass Formation during Sulfurization of Cu-Zn-Sn Oxide Precursors Using ppm Level H2S for Preparing CZTS Thin Films”, Materials Science &Technology (MST) Fall Meeting 2016, Salt Lake City, UT, USA.

O. Awadallah; Zhe Cheng. “In-situ Raman Monitoring of Cu2ZnSnS4 (CZTS) Solar Absorber Material at Elevated Temperatures”, Materials Science &Technology (MST) Fall Meeting 2016, Salt Lake City, UT, USA.

O. Awadallah; Cheng, Zhe. “In Situ Raman Monitoring of Cu2ZnSnS4 Decomposition and Oxidation at Elevated Temperatures”, Materials Research Society (MRS) Spring Meeting 2016, Phoenix, AZ, USA.

Shichen Sun; O. Awadallah; Zhe Cheng. “Use of Patterned Metal Anodes for Studying Hydrogen Electrochemical Oxidation Reaction in proton-conducting SOFCs”, 229th ECS Meeting 2016, San Diego, CA, USA.

O. Awadallah; Zhe Cheng. “Sulfurization of Sol gel-based Cu-Zn-Sn oxide precursors using ppm level hydrogen sulfide”, Materials Research Society (MRS) Spring Meeting 2016, Phoenix, AZ, USA.

O. Awadallah; Zhe Cheng. “In situ Raman Characterization of Cu2ZnSnS4 Solar Absorber Materials,” Photovoltaics Specialist Conference (PVSC), 2015 IEEE 42nd, New Orleans, LA, USA.

O. Awadallah; Ragaie Rashad; and Abdalla Wifi, “Study of the effect of Anode/Cathode geometry on the yield rate and quality of the MWCNTs synthesized by Submerged arc discharging”, ASME 2013 International Manufacturing Science and Engineering Conference, Madison, WI, USA.