Exponent®
Engineering & Scientific Consulting

Mostafa Ahmadzadeh, Ph.D.

Senior Engineer | Materials Science and Electrochemistry
Natick
+1-508-903-4630 | mahmadzadeh@exponent.com

Professional Profile

Dr. Ahmadzadeh is a materials engineer with specific expertise in process-structure-property relationships of glasses and ceramics. Employing a variety of advanced analytical materials characterization techniques, he has developed a deep understanding of composition-structure-crystallization of glasses and glass-ceramics. He has also investigated natural silicate analogues for such glasses to understand their long-term alteration mechanisms.

In addition, Dr. Ahmadzadeh has worked on fractography and failure analysis of glasses and ceramics for several applications, as well as metals used in automotive suspension parts. He is experienced in magnetism and magnetic materials investigations, and his past research involved him in synthesis and characterization of electrical and magnetic nano-ceramics (multiferroics) with applications in smart devices, sensors, high-density solid-state memories and digital recording fields. He has extensive experience in communicating his technical work in collaborative and multi-disciplinary environments.

During his PhD and postdoctoral studies, Dr. Ahmadzadeh worked on iron-containing alumino-silicate glasses to help formulate durable glasses for safe disposal of radioactive wastes. He also worked with geologists and archaeologists to identify and date (paleomagnetism) natural glasses as analogues for radioactive waste glasses. Owing to working in a well-equipped characterization lab as the senior research assistant prior to Exponent, he has advised and helped internal and external research groups with their materials characterization work. He has developed expertise in X-ray diffraction (XRD) and Rietveld analysis, electron microprobe – scanning electron microscopy (SEM) with energy dispersive spectroscopy (EDS) and wavelength dispersive spectroscopy (WDS), differential thermal analysis (DTA) and thermogravimetric analysis (TGA), vibrating sample magnetometry (VSM), polarized-light optical microscopy (petrography), Raman spectroscopy, IR spectroscopy (FTIR), UV-vis spectroscopy, Mössbauer spectroscopy, mechanical testing techniques, and more. Furthermore, Dr. Ahmadzadeh has taught undergrad level Materials Characterization (X-ray diffraction), Materials Laboratory, as well as Fundamental of Thermodynamics at Washington State University.

Academic Credentials & Professional Honors

Ph.D., Materials Science and Engineering, Washington State University, 2019

M.Sc., Materials Selection and Characterization, University of Tehran, Iran, 2014

B.Sc., Metallurgy and Materials Engineering, University of Tehran, Iran, 2011

Roy G. Post foundation scholarship (dedicated to the safe management of nuclear wastes), 2018

ACerS Nuclear & Environmental Technology Division students award, MS&T, 2018

National Science Foundation (NSF) student grant, 12th Pacific Rim conference, 2017

Licenses and Certifications

Professional Engineer Metallurgical, California, #2050

Academic Appointments

Postdoctoral Research Associate, Mechanical & Materials Engineering, Washington State University, 2019-2020

Professional Affiliations

American Ceramic Society (ACerS)

Languages

Farsi

Publications

Ahmadzadeh M, Scrimshire A, Mottram L, Stennett M, Hyatt N, McCloy J, “Structure of NaFeSiO4, NaFeSi2O6, and NaFeSi3O8 glasses and glass-ceramics”, American Mineralogist: Journal of Earth and Planetary Materials, 105(9),1375-1384, (2020).

Ahmadzadeh M, García-Lasanta C, Housen B, and McCloy J, “Archaeomagnetic dating of vitrified Broborg hillfort in southeast Uppsala, Sweden” Journal of Archaeological Science: Reports, 31, 102311 (2020).

Ahmadzadeh M, Olds T, Scrimshire A, Bingham P, McCloy J, “Structure and properties of Na5FeSi4O12 crystallized from 5Na2O-Fe2O3-8SiO2 glass” Acta Crystallographica Section C, 74(12), 1595-1602 (2018).

Ahmadzadeh M, Romero C, McCloy J, “Magnetic analysis of commercial hematite, magnetite, and their mixtures” AIP Advances, 8(5), 056807 (2018).

Ahmadzadeh M, Marcial J, McCloy J, “Crystallization of iron-containing sodium aluminosilicate glasses in the NaAlSiO4-NaFeSiO4 join” Journal of Geophysical Research: Solid Earth, 122(4), 2504-2524 (2017).

Ahmadzadeh M, Ataie A, Mostafavi E, “The effects of mechanical activation energy on the solid-state synthesis process of BiFeO3”, Journal of Alloys and Compounds, 622, 548-556 (2015).

Ahmadzadeh M, Ataie A, Mostafavi E, “Synthesis of nano-structured bismuth ferrite by mechano-thermal route” Advanced Materials Research, 829, 722-726 (2014).

Lere-Adams A, Ahmadzadeh M, Smith-Gray N, Bollinger D, Boroughs S, & McCloy J, “In situ crystallization and magnetic measurement of hexaferrite glass-ceramics” AIP Advances, 11(3), 035318, (2021).

Balasubramanya N, Sun Z, Ahmadzadeh M, Kamali S, Neuville D, McCloy J, & Goel A, “Impact of non-framework cation mixing on the structure and crystallization behavior of model high-level waste glasses”, Journal of the American Ceramic Society, In Press, (2021).

McCloy J, Marcial J, Clarke J, Ahmadzadeh M, Wolff J, Vicenzi E, Bollinger D, Ogenhall E, Englund M, Pearce C, Sjöblom R, Kruger A, (2021). “Reproduction of melting behavior for vitrified hillforts based on amphibolite, granite, and basalt lithologies” Scientific reports, 11(1), 1-18, (2021).

Nienhuis E, Smith-Gray N, Cocking G, Marcial J, Zhang Y, Ahmadzadeh M, Goel A, McCloy J, “A comparative study on the effect of Zr, Sn, and Ti on the crystallization behavior of nepheline glass” Journal of Non-Crystalline Solids, 569, 120970 (2021).

Chen H, Marcial J, Ahmadzadeh M, Patil D, & McCloy J, “Partitioning of rare earths in multiphase nuclear waste glass-ceramics”, International Journal of Applied Glass Science, 11(4), 660-675, (2020).

Moore J, Nienhuis E, Ahmadzadeh M, McCloy J, “Synthesis of greigite (Fe3S4) particles via a hydrothermal method” AIP Advances, 9(3), 035012 (2019).

Khanal L, Ahmadzadeh M, McCloy J, Qiang Y, 'Relationship between Nanostructure-Magnetic Property Induced by Temperature for Iron Oxide Nanoparticles in Vacuum, Ar and O2 Environments', Journal of Magnetism and Magnetic Materials, 166158, (2019).

Danaei R, Varghese T, Ahmadzadeh M, McCloy J, Hollar C, Saleh MS, Park J, Yanling Z, Panat R, "Ultrafast Fabrication of Thermoelectric Films by Pulsed Light Sintering of Colloidal Nanoparticles on Flexible and Rigid Substrates", Advanced Engineering Materials, 21(1), 1800800 (2019).

McCloy J, Marcial J, Patil D, Saleh M, Ahmadzadeh M, Chen H, Crum JV, Riley BJ, Kamat H, Bréhault A, Goel A, Barnsley KE, Hanna JV, Rajbhandari P, Corkhill CL, Hand RJ, and Hyatt NC, "Glass structure and crystallization in boro-alumino-silicate glasses containing rare earth and transition metal cations: a US-UK collaborative program," MRS Advances, 4 (17-18), 1029-1043 (2019).

Deshkar A, Ahmadzadeh M, Scrimshire A, Han E, Bingham P, Guillen D, McCloy J, Goel A, 'Crystallization behavior of iron-and boron-containing nepheline (Na2O●Al2O3●2SiO2) based glasses: Implications on the chemical durability of high-level nuclear waste glasses." Journal of the American Ceramic Society, 102(3), 1101-1121 (2018).

Cao Y, Ahmadzadeh M, Xu K, Dodrill B, McCloy J, "Multiphase Magnetic Systems: Measurement and Simulation" Journal of Applied Physics, 123(2), 023902 (2018).

Marcial J, Ahmadzadeh M, McCloy J, "Effect of Li, Fe, and B Addition on the Crystallization Behavior of Sodium Aluminosilicate Glasses as Analogues for Hanford High Level Waste Glasses" MRS Advances, 2(10), 549-555 (2016).

Mostafavi E, Ataie A, Ahmadzadeh M, Palizdar M, Comyn TP, Bell AJ "Synthesis of nano-structured Bi1-xBaxFeO3 ceramics with enhanced magnetic and electrical properties" Materials Chemistry and Physics, 162, 106-112 (2015).

Mostafavi E, Ataie A, Ahmadzadeh M, "Characterization of nano-structured multiferroic bismuth ferrite produced via solid state reaction route" Advanced Materials Research, 829, 683-687 (2014).

Presentations

Ahmadzadeh M, McCloy J, "Iron age Swedish vitrified hillfort: analog for nuclear waste glasses" Oral presentation, 25th International Congress on Glass (ICG) 2019, Boston, MA, June 2019.

Ahmadzadeh M, McCloy J, "Structural role of iron in sodium aluminosilicates and sodium silicates" Oral presentation, American Ceramic Society (ACerS) Glass and Optical Division (GOMD) 2018 meeting, San Antonio, TX, May 2018.

Ahmadzadeh M, McCloy J, "Role of Fe in the crystallization of nepheline-based aluminosilicates" Oral

presentation, 12th Pacific Rim Conference on Ceramic and Glass Technology (PACRIM 12), including GOMD 2017 meeting, Waikoloa, HI, May 2017.

Ahmadzadeh M, McCloy J, "Crystallization of nepheline-based iron-containing sodium aluminosilicate glasses" Poster presentation, GOMD 2016 meeting, Madison, WI, May 2016.

Ahmadzadeh M, McCloy J, "Role of iron in sodium aluminosilicates and sodium silicates" Poster presentation, Materials Science and Technology (MS&T) 2018 Conference, Columbus, OH, Oct 2018.

Ahmadzadeh M, McCloy J, "Structural role of iron in nepheline-based aluminosilicates for nuclear waste applications" Oral presentation, Waste Management Symposia 2018 Conference, Phoenix, AZ, Mar 2018.

Ahmadzadeh M, McCloy J, "Glass for nuclear waste applications" Invited talk, Seminar in Materials Science and Engineering Program, Washington State University, Pullman, WA, Apr 2018.

Ahmadzadeh M, McCloy J, "Study of glassy hillforts for nuclear waste applications" Oral presentation, 73rd Annual Northwest Regional Meeting (NORM) of American Chemical Society, Pacific Northwest National Lab, Richland, WA, June 2018.

Ahmadzadeh M, McCloy J, "Magnetic analysis of commercial hematite, magnetite and their mixtures" Poster presentation, 62nd Annual Conference on Magnetism and Magnetic Materials (MMM), Pittsburgh, PA, Nov 2017.

Ahmadzadeh M, Ataie A, "Synthesis of nano-structured bismuth ferrite by mechano-thermal route" Poster presentation, International Conference on Ultrafine Grained and Nano-Structured Materials (UFGNSM) 2013, Tehran, Iran, Nov 2013.

Peer Reviews

Journal of Non-Crystalline Solids

Journal of Ceramics International

Journal of Alloys and Compounds

Journal of Materials Research

MRS Communications

PLOS One