



**Hassan Ghassemi-Armaki, Ph.D.,
Metallurgy & Additive Manufacturing - Data Science (Minor)**

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Professional Summary

- Working with other R&D orientated industrial partners to collaborate with APS in ANL to bring the solution and understanding of materials engineering problems in industry for future breakthrough metallic products.
- Collaborate with Jonathan D. Almer team in APS on microstructural evaluation of metallic materials under of service condition.
- Expert in metallic materials, reg. microstructure, mechanical properties, and failure analysis (15 years Exp.).
- North America (NA) Coordinator of Additive Manufacturing Application promotion with external OEMs.
- Investigated effect of powder metallurgy design on additive manufacturing process and end-part quality.
- Develop testing methods to evaluate the effects of various conditions on end-use properties of additive products.
- Develop welding solution for Automotive sheet metal joining; Effect of RSW process and Laser beam characteristics.
- Work with R&D team on Graphene/Graphite coating for battery packaging, anode electrode and sensor application.
- Advanced characterization of welds and Joints for implementation in CAE design reg. crash & safety performance.
- Investigate Digital Product Development for using data science approach (e.g. ML, AI) in materials and process.
- Studied the shape memory alloys (Microstructure-mechanical Property Relationships).
- Leading university projects, consortia or Government funded research projects (USCAR, DOE, A/SP, etc.).
- Team leader of Auto-Steel Partnership Joining Team (Part of AISI)
- 1st Vice Charman of D8 Main Committee on Automotive Welding, American Welding Society.

Professional Experience

North America Additive Manufacturing Coordinator, ArcelorMittal Global R&D, USA March 2019-Present

- Work with global R&D team and customer team to develop application for Iron-based additive manufacturing.
- Investigate additive manufacturing process “DED, PBF, Binder Jetting” for different application design.
- Effect of microstructure and powder/wire on solidification during Add. Manuf. and end-use properties evaluation.

Lead Research Engineer, ArcelorMittal Global R&D, Automotive Product Research & Application March 2014-Present

- Work with industrial partners for development of new welding and mechanical joining solution for implementation of new AHSS materials along with OEMs requirements for assembly.
- Work with R&D partners to establish product specifications, scope, budget, and timeline details to meet business objectives in welding and joining.
- Perform and provide solutions for fatigue and durability issues of assemblies.
- Work on breakthrough approaches for dissimilar steel/Al joining
- Develop materials with improved coating which meet the customer requirements for welding.

Senior Research Associate, Brown University, RI, USA Oct. 2010-Feb. 2014

- Designed and conducted the novel characterizations to predict crystal plasticity and formability of automotive sheet steels in collaboration with GM and under DOE ICME10 (Integrated Computation Materials & Engineering) project.
- Characterized the mechanics by combination of FIB/SEM, Nanoindentation and Lift out TEM sample preparation. Analyzed texture and residual stress by EBSD and XRD. Generate 3D microstructure for prediction of formability & failure of sheet metals
- Investigated mechanical properties of Iron and Aluminum based alloys.

Research associate of NEDO, Tohoku University, Sendai, Japan Jan. 2009-Sep. 2010

- *Supervised heat-resistant materials group*, and supervised 8 researchers (1 Ph.D., 2 M.Sc. and 5 bachelor students)

- Evaluated grain size, texture, precipitates, inclusions, and their effect on mechanical properties
- Characterized intermetallic particle by electron microscopes (TEM, SEM), and chemical composition by EDX, EELS
- Investigated surface failure by preparation of extraction replica TEM sample
- Investigated the change in crystal orientation and texture of grains by Electron Back Scatter Diffraction (EBSD)
- Interacted and communicated with project partners, and government agencies to address the product problems

Laboratory Research Assistant, Advanced Phase Transformation Lab., Tehran Univ. July 2003 - 2005

- Designed and conducted hot deformation, thermomechanical processing, and heat treatment test on Ti-Al alloys
- Basic microstructural characterization of Aluminium metal-matrix composites (MMCs)
- Investigated fluidity of aluminium casting, and evaluation of dendrites structure in aluminium alloys

Education

M. Sc., *Data Science*, Master of Science, Northwestern University, Expected Graduation Q2-2021

Ph. D., Materials science and engineering, Tohoku University, Sendai, Japan, Nov. 2008.

M. Sc., Characterization, Selection & Design of Materials, Univ. of Tehran, 2005; *2nd student in M.Sc. class 2005.*

B. Sc., Metallurgy, University of Tehran, 2002; *Rank 3 among of all undergraduate students in class 2002.*

Honors and Awards

- Auto-Steel Partnership Award for Individual category and Joining team lead. – [News Link](#)
- American Iron and Steel Institute (AISI), Manufacturing Technology Award, 2019. - [News Link](#)
- Technical Innovation Award, Low LME Susceptible Gen3 Next Gen. AHSS, ArcelorMittal-North America, 2018
- Customer Critical Intervention Award, Process Difficult to weld Next Gen. AHSS, ArcelorMittal-North America.
- William N. Findley award for paper: Acta Materialia, 61 (2013) 3640, Brown Univ., RI, USA
- Best poster award of New England workshop on the mechanics of materials and structures, Nov. 2012
- Twice outstanding poster award of the Iron and Steel Institute of Japan (ISIJ) meeting; Sep. 2009 & Sep. 2010
- Japanese NEDO Science Fellow (2009-10); Japan Government Monbukagakusho Ph.D. scholarship (2005-08)

Skill Sets

- **Welding:** Expert in RSW and GMAW. Simulation of welding process with FEA-Based softwares.
- **Mechanical Tests:** Tensile, Fatigue, Creep, Nanoindentation, Vickers hardness, Digital Image Correlations.
- **Characterization;** Focus Ion Beam (FIB), Making features and lift out TEM samples by FIB, Transition Electron Microscopy (TEM), Scanning Electron Microscopes (SEM), Electron Back Scatter Pattern (EBSP), In-situ SEM and TEM observation at high temperature and under deformation, XRD, AFM, DSC, DTA
 - Clean room, Spin coating, Photo resistant PMMA, Lithography, Thin film profile measurement, PVD, CVD
 - Vacuum Melting Furnaces (VIM and VAR), Heat treatment furnaces, Casting, Forging, Deep drawing
- **Modeling & Programming Language for Data Science:** Experienced with ABAQUS, LS-DYNA, SYSWELD, SORPAS, HyperMesh, *R* and *Python*.
- Reviewer of international journal papers, Acta Mat., Scripta, Mater. Sci. & Eng. A, MMA...

Leadership Experience

- North America (NA) Additive Manufacturing Coordinator **March 2019 – Present**
- 1st Vice Charmain of D8 Main Committee on Automotive Welding, American Welding Society. **Dec. 2019 – Present**
- Auto-Steel Partnership Consortium (Joining Team Leader) **August 2017 – Present**
- Coordinator of Welding & Joining for support of North America Customers, ArcelorMittal, NA **Jan. 2017 – Present**
- Lead welding laboratory in R&D, and maintain and upgrades the welding facilities **March 2014 – Present**
- Advised and trained micro-mechanical tests group for different projects, Brown Univ., USA **May 2013 – Feb. 2014**
- Leader of heat-resistant steels group; Managed 8 researchers for two projects, Tohoku Univ., Japan **Jan. 2009-Sep. 2010**

10 Patents - Selected Patents:

- Method for the manufacture of a Galvannealed steel sheet, US Patent App. 16/754,589, 2020.
- A method for the manufacture of a coated steel sheet”, US Patent App. 16/753,739, 2020.

- A Method for the Manufacturing of Liquid Metal Embrittlement Resistant Zinc Coated Steel Sheet”, US Patent App. 16/759,253, 2020.
- Method for producing a high strength steel sheet having high ductility, formability and weldability, and obtained steel sheet”, US Patent App. 16/609,408, 2020.
- Zinc-coated steel sheet with high resistance spot weldability”, US Patent ap. 16/614,734, 2020.
- A method for the manufacturing of liquid metal embrittlement resistant Galvannealed steel sheet”, US Patent App. 16/605,473.

Selected Publications (60 Int. J. Papers; > 1500 Citations; [Google Scholar Profile](#) (h-index: 24))

- Mechanisms of paint bake response in resistance spot-welded first and third generation AHSS, *Materialia*, 2021.
 - In collaboration with Jonathan D. Almer Team in APS.
- Advanced Characterization of HAZ Softening of AHSS for Crash Modeling, *ISIJ International* 57 (8), 1451-1460, 2017.
- Quasi-Static Spot Weld Strength of Advanced High-Strength Sheet Steels, *Welding Journal* 96 (3), 2017.
- Deformation response of ferrite and martensite in a dual phase steel, *Acta Materialia*, 2013.
- Cyclic Micropillar Compression Behavior of Nanocrystalline Textured NiTi Tubes, *Acta Materialia*, 2017.
- Microscale-calibrated modeling of deformation response of Low-carbon Martensite, *Acta Materialia*, 61 (2013) 3640. (*Award*).
- Characterization and Modeling of Spot-Weld Joints in Press Hardening Steels Associated with Softening in Heat Affected Zone, 11th European LS-DYNA CONFERENCE 2017, Austria.
- Contribution of recovery mechanisms of microstructure during long-term creep of Gr. 91 steels, *J. of Nuclear Material*, 433 (2013) 23.
- Transgranular cracking in a liquid Zn embrittled high strength steel, *Scripta Materialia*, 175, 49-54, 2020.
- Plastic deformation of the C14 Laves phase (Fe,Ni)₂Nb, *Scripta Materialia*, 68 (2013) 615. (*Outstanding Paper*)
- Effect of strain-rate on the deformation response of D0 3-ordered Fe₃Al, *Acta Materialia* 103, 909-918.
- Correlation of local constitutive properties to global mechanical performance of advanced high-strength steel spot welds”, *Metallurgical and Materials Transactions A* 51, 2209–2221, 2020.

Presentations & News (> 40 presentations/papers in Int. Conf., Industrial Forums, Invited Talks etc.):

- Laser-Assisted Clinching, Clinch Nut and SPR; Innovative Similar and Dissimilar Joining of Next Gen. of AHSS, Joining in Car Body Engineering, Sep. 2020, Germany.
- Addressing Stamping & Joining Challenges of AHSS through A/SP, Materials in Car Body Engineering 2020. [Link](#)
- Development of Next Gen. Auto-sheet product with enhanced end-use properties ([News Link](#)) and Work with customer team for weld characterization reg. effect of manufacturing effect on weld quality ([News Link](#)):
- Implement new weld modeling for failure prediction during crash and safety design of full vehicle: [News Link](#)
- Provide training presentations for Auto-Steel Partnership Welding Module : [Link](#)
- LME Evaluation of 3rd Gen. Advanced High Strength Sheet Steels, Joining in Car Body Engineering, Feb. 2019, USA.
- Mechanisms of Paint Bake Response in Resistance Spot-Welded First and Third Generation AHSS, International Auto-Body Conference, Sep. 2020, USA. In collaboration with Argonne National Lab, GM & CBMM.
- From Micro to Macro; Enhanced Product Design with Advanced Characterization of Microstructures & Defects, Invited Talk, CHESS – Defects Characterization, Nov. 2019, USA National Labs Workshop.
- Laser Process Modification to Reduce Crater Crack in Zn coated 3rd Gen. AHSS, Collaboration with Ford, to be presented.
- CO-PI of approved proposals for industry-university projects funded by USA and Canadian governments: > \$0.5 M