



Exponent[®]
Engineering & Scientific Consulting

Damon Panahi, Ph.D

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Professional Profile

Dr. Panahi specializes in materials science with specific expertise in physical metallurgy, material characterization, and microstructural-property relationships of metals. He has extensive experience in product development, industrialization, process optimization and failure mode and effects analysis (process and design FMEA) of advanced high strength steels.

Dr. Panahi is also specialized in data science and analytics management. He leverages his skills to optimize and accelerate product development cycles and customer support activities through data management and development of advanced machine learning and optimization algorithms.

Prior to joining Exponent, Dr. Panahi worked as a Senior Research Engineer at ArcelorMittal global research and development center, where he led multiple projects related to design and industrialization. His areas of focus were on fundamental metallurgical investigation on processing-microstructure-property relationship of complex steel chemistries for improving cold formability, surface quality, weldability, and robustness of new high strength steels for automotive structural components. Under Dr. Panahi's leadership, several 3rd generation steels were developed for major automotive manufacturers through collaboration with different production lines across the world.

Prior to joining ArcelorMittal, Dr. Panahi completed his Ph.D. in materials science at McMaster University, where he studied effect of alloying element segregation into interphase boundaries on kinetics of phase transformations in steels. His fundamental research led to development of an atomistic physically based model for accurate prediction of austenite to ferrite transformation in steels.

While working at ArcelorMittal, Dr. Panahi completed another MSc. degree in data science and analytics management from Northwestern University in Chicago, IL. As a domain expert in materials science, he used his data science knowledge to bridge between the two disciplines and accelerate new material development, optimization and characterization processes through data management, and machine learning techniques.

Dr. Panahi is author of several US and international patents, book chapters, and peer-reviewed journal papers. He has delivered presentations at international conferences, and instructed undergraduate courses related to metal forming and phase transformations.

Academic Credentials & Professional Honors

M.S., Data Science, Northwestern University, 2020

Ph.D., Materials Science and Engineering, McMaster University, Canada, 2013

M.Sc., Materials Science, McMaster University, Canada, 2009

M.Sc., Materials Science, Iran University of Science and Technology, 2006

B.Eng., Industrial Metallurgy, Imam Khomeini International University, 2004

PGSD NSERC Scholarship, 2010

Stelco-McMaster Graduate Fellowship, 2009

Prior Experience

Senior Research Engineer, ArcelorMittal Global R&D-Automotive product development team, 2014-2022

Patents

Patent No: 2022/0017985: Cold rolled and heat-treated steel sheet and method of manufacturing the same, 2022 (with Michel Soler, Patrice Alexandre, Magali Bouzat, Anirban Chakraborty, Hassan Ghassemi-Armaki, Olga Girina, Ronan Jacolot, Alexey Koltsov, Aude Nadler)

Patent No: WO 2016/001890 A3: Method for producing an ultra-high strength coated or not coated steel sheet and obtained sheet, 2016 (with Olga A. Girina)

Patent No: WO 2017/115107 A1: Method for producing an ultra-high strength galvanized steel sheet and obtained galvanized steel sheet, 2017 (with Olga A. Girina)

Patent No: 2020/0181729: Zinc-coated steel sheet with high resistance spot weldability", 2020 (with Hassan Ghassemi-Armaki, Anirban Chakraborty, Olga Girina, Pavan C Venkatasurya, Yacine Benlatreche, Sébastien Cremel, Jean-Marc Pipard)

Publications

Peer-reviewed Journal Publications:

Azizi H, Panahi D, Fazeli F, Tian J, Abu Samk K, Zurob HS., Mechanical Properties of Ausformed Carbide-Free Bainite. Metallurgical and Materials Transactions A 2021; 52: 2402–2410.

Van Landeghem H, Langelier B, Gault B, Panahi D, Korinek A. Investigation of solute/interphase interaction during ferrite growth. Acta Materialia 2017; 124: 536-543.

Van Landeghem H, Langelier B, Panahi D, Purdy GR, Hutchinson CR, Zurob HS. Solute Segregation During Ferrite Growth: Solute/Interphase and Substitutional/Interstitial Interactions. JOM 2016; 68 (5): 1329-1334.

Panahi D, Van Landeghem H, Hutchinson CR, Purdy GR, Zurob HS. New insights into the limit for non-partitioning ferrite growth. Acta Materialia 2015; 86: 286-294.

Guo M, Panahi D, Van Landeghem H, Hutchinson CR, Purdy GR, Zurob HS, A comparison of ferrite growth kinetics under denitriding and decarburizing conditions. Metallurgical and Materials Transactions A 2015; 46 (6): 2449-2454.

Qiu C, Zurob HS, Panahi D, Brechet Y, Purdy GR, Hutchinson CR. Quantifying the solute drag effect on ferrite growth in Fe-CX alloys using controlled decarburization experiments. Metallurgical and Materials Transactions A 2014; 44 (8): 3472-3483.

Zurob HS, Panahi D, Hutchinson CR, Brechet Y, Purdy GR. Self-Consistent model for planar ferrite growth in Fe-C-X alloys. Metallurgical and Materials Transactions A 2012; 44 (8): 3456-3471.

Panahi D, Bai YF, Zurob HS, Purdy GR, Hutchinson CR, Bréchet Y. Kinetic Transitions during Non-Partitioned Ferrite Growth in Fe-C-Mn Alloys. Solid State Phenomena 2011; 172-174: 539-548.

Panahi D, Malakhov DV, Gallerneault M, Marois P. Influence of cooling rate and composition on formation of intermetallic phases in solidifying Al-Fe-Si melts. Canadian Metallurgical Quarterly 2011; 50(2): 173-180.

Malakhov DV, Panahi D, Gallerneault M, On the formation of intermetallics in rapidly solidifying Al-Fe-Si alloys. Calphad 2010; 34 (2): 159-166.

Conference Proceedings and Presentations:

Girina O, Yakubovsky O, Panahi D, Jansto S. Effect of Al and B alloying on phase transformation in Nb microalloyed Q&P steels, MS&T, Materials Science and Technology 2018, Columbus, OH; 1157-1165

Poliak E, Girina O, Venkatasurya P, Panahi D. High Temperature Tempering Behavior of Martensite During AHSS Manufacturing. MS&T, Materials Science and Technology 2017, Pittsburgh, PA; 433-440.

Girina O, Fonstein N, Yakubovsky O, Panahi D, Bhattacharya D, Jansto S. The influence of Mo, Cr, and B alloying on phase transformation and mechanical properties in Nb added high strength dual phase steels. HSLA Steels, Microalloying & Offshore Engineering Steels 2015, Hangzhou, Zhejiang Province, China; 237-245.

Book Chapter:

Azizi H, Girina O, Panahi D, Zhou T, Zurob H S. Processing of Ferrous Alloys. pp 37–82, In: Rana, R. (eds) High-Performance Ferrous Alloys. Springer 2021, . https://doi.org/10.1007/978-3-030-53825-5_2

Thesis & Dissertation

Panahi D. Effect of alloying elements on ferrite growth in Fe-C-X ternary alloys. Ph.D. Dissertation, McMaster University, Hamilton, ON, 2013.

Panahi D. Precipitation of Intermetallic Phases from Rapidly Solidifying Aluminum Alloys. MSc. Dissertation, McMaster University, Hamilton, ON, 2009.

Presentations:

Panahi D, Venkatasurya P, Jun HJ, Girina O, Fonstain N. Microstructural Analysis of Medium Carbon Steels during Quenching and Partitioning (Q&P) Treatment. MS&T - Materials Science & Technology Conference & Exhibition, Columbus, OH, USA, October 2015.

Van Landeghem H, Langelier B, Panahi D, Purdy GR, Zurob HS. Application of 3D Atom Probe Tomography to the Segregation of Solute at Austenite/Ferrite Interfaces, Solid-Solid Phase Transformation in Inorganic Materials, Whistler, BC, Canada, June 2015.

Panahi D, Zurob HS, Purdy GR, Hutchinson CR, Brechet Y, New Model for Kinetics of the Austenite to Ferrite Transformation in Fe-C-X Systems (X=Mo,Mn,Cr,Si,Ni and etc.), TMS Annual Meeting & Exhibition, Orlando, FL, USA, March 2012.

Purdy GR, Zurob HS, Panahi D, Hutchinson CR, Brechet Y. Kinetic Transitions in the growth of ferrite during the decarburization of alloyed austenite, TMS Annual Meeting & Exhibition, San Diego, CA, USA, Feb 2011.

Panahi D, Zurob HS, Hutchinson CR, Purdy GR, The Solute Drag Effect on Ferrite Growth in Fe-C-Mo Alloys Studied by Controlled Decarburization, MS&T - Materials Science & Technology Conference & Exhibition, Houston, TX, USA, October 2010.

Panahi D, Zhang S, Zurob HS, Purdy GR, Investigation of ferrite growth kinetics during $\gamma \rightarrow \alpha$ precipitation the in Fe-Mo-C alloys. Solid-Solid Phase Transformation in Inorganic Materials, Avignon, France, June 2010.

Peer Reviews

Materials Science and Technology

Materials Today Communications

Engineering Failure Analysis