

Curriculum Vitae

I. Personal Information

Name: Hani Henein
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Professional Engineering Status: APEGGA (Alberta) Member since 2003

Ia. Education

PhD, Metallurgical Engineering, 1981
University: University of British Columbia
Thesis title: Bed behaviour in rotary cylinders with applications to rotary kilns
Advisor name: A. P. Watkinson (1976-1980), J. K. Brimacombe (1976-1980)

MSc, Metallurgical Engineering, 1975
University: McGill University
Thesis title: Hydrodynamics of solid additions to liquid steel
Advisor name: R. I. L. Guthrie (1972-1975)

BSc, Metallurgical Engineering 1972
University: McGill University

Ib. Appointments

Director, July 1991 – present.

Advanced Materials and Processing Laboratory, University of Alberta

Professor, June 1989 – present.

*Department of Mining, Metallurgical and Petroleum Engineering,
Department of Chemical and Materials Engineering, University of Alberta*

Visiting Professor,

Nov. 2012 – Dec. 2012, Université de Rouen, Rouen, France
Mar. 2011 – Apr. 2011, Université de Rouen, Rouen, France
Jan. 2011 - Feb. 2011, Grande Ecole Supérieure des Mines de Paris, Sophia-Antipolis, France
May 1999 - Aug. 1999, Grande Ecole Supérieure des Mines à Nancy, France
Jul. 1996 - Aug. 1996, Department of Materials Science and Engineering, McMaster University
Nov. 1995 - Dec. 1995, Department of Metallurgical and Materials Engineering, University of Alabama, Tuscaloosa, AL, USA

II: Awards and Distinctions

IIa: International recognition

2021 **Fellow of the Institute of Materials, Minerals and Mining, London, United Kingdom.**
2021 **Fellow of The Minerals, Metals and Materials Society, USA**

For pioneering developments in pipe-line steels, spray forming and determination of liquid metal properties; and an outstanding record of publications, international awards and participation in professional society affairs.

2014 **Fellow of ASM International, USA**

For scientific and engineering achievements in developing the understanding between structure and processing for a wide range of metallic alloys and processing methods, targeting industrially relevant materials in the energy and aerospace fields while mentoring students and creating innovative materials science teaching methodologies.

Iib: National Fellowships

2006 **Fellow of Canadian Institute of Mining, Metallurgy and Petroleum**

For outstanding contributions to the Canadian Minerals Industry and to CIM.

2003 **Fellow of the Canadian Academy of Engineers**

For distinction in the art and science of engineering in Canada.

2002-2004 **Killam Research Fellow**

Awarded after national Canadian competition.

Iic: Prestigious lectures and research awards

2019-2020 **ASM Canada Council M. Brian Ives Lecturer, ASM International**

For distinguished and significant contributions to the Canadian materials community

2019 **MetSoc Award for Research Excellence, MetSoc of CIM**

For his dedication to teaching and exceptional research innovations in materials development and processing.

2016 **CIM Distinguished Lecturer, CIM**

In recognition of excellence in teaching and innovative generation of knowledge through multi-disciplinary collaborations.

2011 **Metal Chemistry Award, MetSoc of CIM**

To recognize outstanding contributions to metallurgical chemistry.

2002 **Killam Research Fellowship, The Canada Council for the Arts**

To recognize and support distinguished Canadian scholars who have established an outstanding reputation in their area of research.

1985 **Outstanding Young Member, Pittsburgh Chapter, ASM International**

For the Outstanding Young Member in the Chapter.

1983 **George Tallman Ladd Award, Carnegie-Mellon University,**

For excellent promise in research.

Iid: Best paper awards

2013 **Charles Hatchett Award, IOM³, London, UK.**

For the best paper on the science and technology of niobium and its alloys.

J. Lu, O. Omotoso, J.B. Wiskel, D.G. Ivey, H. Henein, "Strengthening mechanisms and their relative contributions to the yield strength of microalloyed steels", Met Trans A, 43(9), 3043-3061, doi: 10.1007/s11661-012-1135, 2012.

2011 **MetSoc-CIM Best Paper Award**

For the best paper published in the Canadian Metallurgical Quarterly Volume 49.

H. Henein, V. Buchoud, R.-R. Schmidt, C. Watt, D. Malahof, C.-A. Gandin, G. Lesoult, V. Uhlenwinkel: "Droplet solidification of Impulse Atomised Al-0.61 and 1.9 wt% Fe", CMQ, v49(3), 2010, pp 275-292.

2008 **Best Research Paper at International Pipeline Conference**

For the best paper published and presented at the 2008 International Pipeline Conference.

- J. Lu, D.G. Ivey, H. Henein, J.B. Wiskel, O. Omotoso, "Extraction and Characterization of Nano-precipitates in Microalloyed Steels", Proceedings of IPC 2008, 7th International Pipeline Conference, IPC2008-64135, 2008.
- 2004 **MetSoc-CIM Best Paper Award.**
For the best paper published in the Canadian Metallurgical Quarterly Volume 42. S.J. Roach and H. Henein "A Dynamic Approach to Determining the Surface Tension of a Fluid", CMQ, Vol. 42(2), 175-186.
- 1976 **Henry Marion Howe Medal, ASM,**
For Best Paper Published in Metallurgical Transactions, volume 6B. R. I. L. Guthrie, R. Clift and H. Henein: "Contacting Problems Associated with Aluminum and Ferro-Alloy Additions in Steelmaking-Hydrodynamic Aspects", Metall. Trans. B, Vol. 6B, pp.321-329, June 1975.
- 1975 **John Chipman Award, Process Technology Division of the ISS-AIME (presently AIST),**
For excellence and originality in contributing to the process technology relating to the processing and technology of iron and steel.
H. Henein, R. I. L. Guthrie, and R. Clift: "Contacting Problems Associated with Aluminum and Ferro-Alloy Additions in Steelmaking-Hydrodynamic Aspects", Physical Chemistry of Production or Use of Alloy Additives, J. Farrell, Editor, Proceedings of Sessions from the 103rd AIME Annual Meeting, 1974, pp.29-44.

Iic: Recognition for distinguished service to the profession

- 2014 **Minerals and Metals Sector Gold Award, Natural Resources Canada**
For dedication and exceptional achievements in Policy and Program Excellence.
- 2004 **Silver Medal, The Metallurgical and Materials Society (MetSoc of CIM)**
For his leadership and contribution to the development and maintenance of the Metallurgical Society of CIM.
- 2001 **Presidential Citation, The Iron and Steel Society (presently AIST).**
For leadership and vision in promoting young members and students in ISS.
- 1999 **President Plaque, The Metallurgy and Materials Society (MetSoc of CIM)**
In recognition of distinguished service to MetSoc.
- 1994 **John W. Farrell Award, Process Technology Division, ISS (presently AIST)**
For dedicated leadership to the Process Technology Division of ISS.
- 1986 **President's Award, Pittsburgh Chapter, American Society for Metals**
For Outstanding Service to the Chapter.

III: Publications

Category of Publications	Career Total
Refereed Journal Papers	167
Invited and Keynote Papers	137
Papers Published in Conference Proceedings	207
Books	9
Chapters in Books,	10
Patents and Disclosures	4
Notes for Industrial Courses	10
Total Number of Publications	544

IV: Supervision of Students and other Researchers (completed and *current*)

Bachelor Thesis Students	67 (2)
Master's Students	45 (11)
Ph.D. Students	14 (6)
PDF/Other Researchers	12 (3)
Total	137 (22)

V. Examples of Patents and Disclosures

- T. Lehmann, A. Qureshi, T. Wolfe, C. Milburn, V.B. De Souza, "A software toolchain and algorithms for the fabrication of closed-loop robotic metal additive manufacturing," INV-2020-013, University of Alberta, February 2, 2021.
- R. Samson, A. Qureshi, H. Henein, T. Lehmann and T. Wolfe, "In-situ automated scan-assisted repair by additive manufacturing," INV-2020-004 University of Alberta, November 30, 2020.
- H. Henein, A-A Bogno, J. Valloton, and M. Rappaz, "Eutectic structures for applications in additive manufacturing (AM) using lattice structures," TEC-ID 2020037, University of Alberta, July 14, 2020.
- D. Yuan, H. Henein, J. A. Fallavollita, "Method and Apparatus for Producing Droplets", US Patent 5,609,919, March 11, 1997; Canadian Patent 2,147,407, 2003.

VI. Books and Book Chapters (2017 to present listed)

- Q. Champdoizeau and H. Henein, "The measurement of density, surface tension, and viscosity of metallic liquids by the Discharge Crucible method," Metallurgy in Space: Recent results from ISS, H.J. Fecht and M. Mohr, Editors, Springer-Nature, 2021, in press.
- H. Henein, U. Fritsching, V. Uhlenwinkel, Metal Spray and Spray Deposition Processes, Springer International Publishing, 2017, 570, ISBN: 978-3-319-52687-4.
- G. Zepon, N. Ellendt, V. Uhlenwinkel, H. Henein, "Processing aspects in spray forming", Chapter 8, H. Henein, U. Fritsching and V. Uhlenwinkel, Metal Spray and Spray Deposition Processes, Springer-Nature, 2017, pages 297-348.
- P. Delshad Khatibi, H. Henein, U. Fritsching, "In-situ, real time diagnostics in the spray forming process", Chapter 6, H. Henein, U. Fritsching and V. Uhlenwinkel, Metal Spray and Spray Deposition Processes, Springer-Nature, 2017, pages 221-263.
- A-A. Bogno, H. Henein, V. Uhlenwinkel, E. Gartner, "Single fluid atomization fundamentals", Chapter 2, H. Henein, U. Fritsching and V. Uhlenwinkel, Metal Spray and Spray Deposition Processes, Springer-Nature, 2017, pages 9-48.
- D. Apelian, H. Henein, U. Fritsching, "Introduction", H. Henein, U. Fritsching and V. Uhlenwinkel, Metal Spray and Spray Deposition Processes, Springer-Nature, 2017, pages 1-7.

VII. University and industrial Workshops and Short Courses (17 total, 2017 to present listed)

- 5th Annual "2017 Pipeline Materials Workshop: Steels for Sour Service" June 1, 2017.
- 6th Annual "2018 Pipeline Materials Workshop: Low Temperature Toughness of Pipeline Steel" June 19, 2018.
- 7th Annual "2019 Pipeline Materials Workshop: Pipeline Performance: Best Practices" May 30, 2019.

VIII. Research Funding

Almost \$19 million of funding has been awarded from the following organizations from 1989 to 2021:

Government agencies: Natural Science and Engineering Research Council of Canada; Alberta Innovates; European Space Agency; Canadian Space Agency, Canadian Foundation for Innovation

Industry: Acuren, Alcoa, CRC Evans, Cytemp Specialty Steel Div., DuPont, Eckart Werke, Enbridge, EVRAZ NA Canada Inc, Equispheres Inc, Firebird, Genics, Ontario Hydro, Inco, Manitoba Rolling Mills-Gerdau, Noranda, Novelis, Stelco, SGS Canada, Trans Canada Pipelines, Rhone-Poulenc, Syncrude, Timinco, Westaim – Sherritt.

V: Service to the Profession: Professional Societies and Foundations (most notable and recent)

American Institute of Mining, Metallurgical and Petroleum Engineers (AIME):

President, 2019-2020

AIST formerly The Iron and Steel Society (ISS):

ISS Board of Directors, Member, 93-95

Process Technology Division (PTD), Chairman, 93-94, Officer, 91-95

ASM Int'l:

Historical Landmark Award Selection Committee, Member, 21-24

CIM-The Metallurgical Society (MetSoc):

President, 1998

The J. Keith Brimacombe Foundation:

The J Keith Brimacombe Prize Committee, Chairman, 99-12

Board of Trustees, Member, 98-12

VI. Publications (most notable and recent)

T. Lehmann, D. Rose, E. Ranjbar, M. Ghasri-Khouzani, H. Henein, T. Wolfe and A.J. Qureshi, “Large scale metal additive manufacturing: a holistic review of the state of the art and challenges,” *International Materials Reviews*, v67 (4), 2022, 410-459, 10.1080/09506608.2021.1971427, Invited

D. Rose, J. Forth, H. Henein, T. Wolfe, and A.J. Qureshi, “Automated semantic segmentation of NiCrBSi-WC optical microscopy images using convolutional neural networks,” *Computational Materials Science*, accepted, Feb, 2021, 33 pages.

S. Yin, A-A. Bogno, H. Henein, M. Gallerneault, “On the role of Sc in powders and spray deposits of hypoeutectic Al-Mg alloys,” *Journal of Phase Equilibria and Diffusion*, <https://doi.org/10.1007/s11669-021-00934-5>, 12 pages.

J. Valloton, A-A Bogno, M. Rappaz and H. Henein,” Numerical model of rapidly solidified Al-33wt%Cu eutectic growth during Impulse Atomization,” *Met. and Materials Transactions A*, v53A (2), 2022, 460-469.

RSP Flood and H. Henein, “On the role of orificie wetting for Al and Al22.5wt%Cu with Al2O3 in the Discharge Crucible Method,” *Journal of Molecular Liquids*, v345, 2022, 117843, 16 pages.

S. Gawor, J.B. Wiskel, D.G. Ivey, J. Liu and H. Henein, “Evaluation of hydrogen induced cracking resistance of X70 pipeline steel under svere and mild service conditions using ultrasonic analysis,” *IPC 2020-9787*, Proceedings of the 13th International Pipeline Conference, ASME, 2020.

M. Mohammadjoo, L. Collins, R. Lazor, H. Henein, D.G. Ivey, “Influence of cold-wire submerged arc welding on the toughness of microalloyed steel”, *Welding Journal: Welding Research*, 97, 338-s – 352-s, Dec. 2018.

C. Chatelier, J.B. Wiskel, D.G. Ivey, H. Henein, “The Effect of skelp thickness on precipitate size and morphology for X70 microalloyed steel using the Rietveld refinement (Quantitative X-Ray Diffraction)”, *Crystals*, 8(7), 287, 13 pages, <https://doi.org/10.3390/cryst8070287>, July 2018.