

Sridhar Seetharaman

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Brief Description of my Background

I have in my past help several leadership positions:

- Prior to joining ASU, I was a Professor and Associate VP for Research at Colorado School of Mines, where my responsibilities includes: Climate Smart Mining, Road map lead for the Doe NAWI Water Hub, and zero-waste manufacturing.
- Prior to joining CSM, I was a Senior Technical Advisor at the US Department of Energy's Advanced Manufacturing Office (AMO) within EERE and my responsibilities included: Manufacturing of Next Generation Electric Machines, Clean Water Production and Manufacturing for Light Weighting for Transportation.
- Prior to that I was the TATA Steel / Royal Academy of Engineering Chair of Low C Technology at Warwick University. I was the founding director of the Advanced Steel Manufacturing Centre, a 20 Million pound Centre with about 30 personnel, including 5 faculty lines. My responsibilities included personnel hiring and fund raising and strategic management of the center.
- I was the Director of Materials Strategy for the WMG Catapult with the responsibilities of setting the research direction, faculty hiring and developing larger initiatives related to light-weighting and electrification for transportation.
- Until 2013, I was the POSCO Chair at Carnegie Mellon University, where was the Co-Director of the NSF Industry-University Consortium Center for Iron and Steel Research. This Centre comprised 25 companies, which included the major integrated steel producers, scrap based mini mills and supplier companies. The consortium had an annual budget of approximately \$3M.
- I was also the lead of the Materials Theme in the CWP consortium (involving industry and academia) for US DOE-National Energy Technology Laboratory (NETL) funded projects related to materials for enabling new fossil fuel power systems with focus on gasification technologies.
- On the educational side, I was the founder and academic director of the college wide ESTP (Energy Science, Technology and Policy) Master's program.

I am an Associate Editor for MMT A, B and E. I have served in the Editorial boards of ISIJ International, Steel Research International and Metals.

I am currently also, a Guest Professor at USTB in Beijing (China), Brahm Prakash Chair at IISC in Bangalore (India) and a part-time Professor at the University of Swansea (Wales) and University of Warwick (England).

1. Biographical Data

1.A Name

Sridhar Seetharaman

1.B Date of Birth and Nationality

5th of March 1971

US Citizen

1.C Education

| Degree | Discipline | University | Date |
|--------|------------------|----------------------|------|
| M.S. | Mat. Sci. & Eng. | Royal Inst. of Tech. | 1994 |
| Ph.D. | Mat. Sci. & Eng. | MIT | 1998 |

1.D Former Positions

1998-1999. *Research Associate*, Department of Materials, Imperial College of Science, Technology and Medicine, London (UK). Research activities: shape casting of Al, porosity formation during casting, microstructural evolution during VAR processing of Superalloys, molten slag physical properties and continuous casting of steels. Teaching activities: Designed and lectured the core undergraduate class *Chemical Kinetics*

1999-2000. *Visiting Research Scholar*, Department of Materials Science and Engineering, Carnegie Mellon University, Pittsburgh (PA). Research activities: clean steel processing, slag crystallization.

2000-2004. *Assistant Professor*, Department of Materials Science and Engineering, Carnegie Mellon University, Pittsburgh (PA).

2004-2007. Associate Professor, Department of Materials Science and Engineering, Carnegie Mellon University, Pittsburgh (PA).

2007-2013. Professor, Department of Materials Science and Engineering, Carnegie Mellon University, Pittsburgh (PA).

2007-2013. Co-Director, Center for Iron and Steelmaking Research (CISR), Carnegie Mellon University, Pittsburgh (PA). CISR is an industry-academia consortium which includes major steel manufacturers in US and abroad and supplier companies. Our members include Arcelor-Mittal, CORUS-Tata, US-Steel, NUCOR, POSCO, Techn group and others.

2006-2013. POSCO Professor in Materials Science and Engineering, Endowed Chair. Department of Materials Science and Engineering, Carnegie Mellon University, Pittsburgh (PA).

2007-2012. NETL-Resident Faculty Fellow, National Energy Technology Laboratory (US Department of Energy), Pittsburgh (PA).

2008-2011. CWP-Materials Lead CWP consortium involves 5 Universities and the National Energy Technology Laboratory and seeks to address research issues related to coal, gas and oil. The materials lead co-ordinates all the materials projects for the universities. (US Department of Energy), Pittsburgh (PA).

2010 – 2012. Academic Director for Masters program on Energy Science, Technology, and Policy, Interdisciplinary college-wide Masters program

2013-2016. TATA Steel and Royal Academy of Engineering Joint Chair for Research into Low C Materials Technology, University of Warwick, Coventry (UK)

2014-2016. Director of the Advanced Steel Research Centre, University of Warwick, Coventry (UK)

2016-2017. Senior Technical Advisor, EERE, US Department of Energy, Washington DC

2017-2017. Professor and Director of Research and Strategic Initiatives, Colorado School of Mines, Colorado (USA)

2018-2021. Associate VP for Research, Colorado School of Mines

2019-present. Joint Faculty Fellow NREL

2021-present. Professor and Vice Dean of Research and Innovation, Ira A. Fulton Schools of Engineering - Arizona State University

2. Government Committees, Civic Appointments, Board Memberships

1. NASA, Chair of Solidification Panel, 2010 – Research grant proposals
2. National Science Foundation, CAREER Panel review, October, 2008 – Research grant proposals (planned)
3. Department of Energy, NETL-Albany, Office of Science and Engineering Research, Merit Review for Fiscal Year 2006
4. National Science Foundation, Panel review, December 05, 2005 – Research grant proposals
5. NASA, Panel review, July 2004 – Research grant proposals
6. National Science Foundation, Panel review, April 2003 – Research grant proposals
7. National Science Foundation, Panel review, June 2002 – Research grant proposals
8. Board of Directors of Pittsburgh Chapter, Iron & Steel Society, the largest of all ISS local sections. Involves arranging local conferences and short courses in Pennsylvania, 2001-2002

3. Editorial Roles on Publications

1. Member of external advisory board for ISIJ International (Japan)
2. Member of external advisory board for Steel Research International (Germany)
3. Associate Editor for Met. & Mat. Trans. A, B and E
4. Principal Editor for AIST Transactions (AIST-USA)
5. Guest Editor MMTB: Fossil Fuel Materials Challenges
6. Guest Editor MMTE: Energy Consumption in Primary Metals Production
7. AIST Technical Publication on Inclusion Engineering and Clean Steel, Steering committee together with Bill Jones (USS) and Sunday Abraham (SSAB)
8. Co-Editor with R. Guthrie and A. Mclean on Treatise for Process Metallurgy, 3 Volumes published by Elsevier

4. Awards, Prizes, Honors

1. Jerry Silver Award for Best Paper 2017 for your work entitled “Real time measurements of contraction behaviors of peritectic steels during solidification.” Awarded by AIST, 2018
2. TMS 2019 Extraction & Processing Division Distinguished Lecturer
3. Brahm Prakash Visiting Professor IISC, Bangalore, India, 2013-2014
4. Best Paper Award for 19th Conference of Steel Rolling organized by IAS in Rosario, Santa Fe, Argentina, November 2012 for the work entitled “Oxidation and embrittlement in grain boundaries induced by Cu in a low carbon steel with Cr and 0.2% Cu under different thermal and atmospheric conditions”
5. Top Overseas Professor Awarded by the Ministry of Education of China and the State Administration of Foreign Experts Affairs of China. Guest Professor at USTB.
6. Jerry Silver Award for Best Paper 2013 for your work entitled “Effect of Silicon on Hot Shortness.” Awarded by AIST, 2013
7. The American Ceramic Society’s Spriggs Phase Equilibria Award for the paper “Phase Equilibria in Synthetic Coal - Petcoke Slags ($\text{Al}_2\text{O}_3\text{-CaO-FeO-SiO}_2\text{-V}_2\text{O}_3$), 2012
8. Elliott Lectureship Award , for contributions to education and research to the steel industry, Awarded by AIST, 2011
9. Benjamin Richard Teare Teaching Award for his excellence in teaching, course development, leadership, and contributions to curriculum development and implementation. 2008
10. POSCO Development Professorship in Materials Science and Engineering, 2006
11. Philbrook Award, 2004, The Philbrook award recognizes outstanding contributions to both undergraduate and graduate education and was given to the department to honor the memory of Prof. Philbrook.
10. National Science Foundation CAREER award, 2004, The award recognizes and supports the early career-development activities of those teacher-scholars who are most likely to become academic leaders of the 21st century (\$ 600,000)
11. Marcus A. Grossmann Young Author Award, ASM International: Awarded for best paper by author(s) under 40 selected in a specific volume (year) of the journals Metallurgical Transactions A & B, 2003
12. Friedrich Wilhelm Bessel Research Prize, A. von Humboldt, Germany, 2002: Awarded EUR 45,000 for outstanding contributions in research and teaching
13. Charles H. Hertzy Award, Iron and Steel Society, 2001: Awarded to the best paper of the year in steelmaking

14. ALCOA gift (\$10,000)
15. Young Leader Award, Iron and Steel Society, 2000: Awarded to promising young leaders in the Iron and Steel Industry
16. EPSRC Advanced Research Fellow, Eng. and Phys. Sci. Res. Council, UK , 1999: 5 year faculty merit award by UK governmental funding for establishing academic career. Along with the awards I was offered a full time tenured academic faculty position at the Department of Materials, Imperial College of Science, Technology and Medicine
17. Sigma Xi, 1998: Elected as full member of the scientific honor society.
18. Society of Phi Kappa Phi, 2002: Elected as full member of the academic honor society
19. John Wulff Teaching Award, DMSE, MIT, USA, 1997: Awarded for accomplishments in graduate teaching at MIT
20. Hedersstipendiat, KTH, Sweden, 1994: Recipient of the yearly prize at the Royal Institute of Technology of Sweden (KTH) awarded to the best graduate from school of materials technology.

5. Publications

5a. Journal Publication List

1. Y. Xiao, G. Wang, H. Lei and S. Sridhar “Formation pathways for MgO Al₂O₃ inclusions in iron melt, Journal of Alloys and Compounds, 2020, vol. 813, <https://doi.org/10.1016/j.jallcom.2019.152243>
2. M. Maestas, E. Lozano, L. Davis, S. Sridhar, V. Petr, “Experimental Investigation into the Safety Distance for Ethane-Oxygen Gas Explosion Applied to Industrial Cleaning”, Blasting and Fragmentation, Vol. 13, No. 1, 2019
3. H. Gagarin , S. Sridhar, I. Lange, M.D. Bazilian, “Considering non-power generation uses of coal in the United States”, Renewable and Sustainable Energy Reviews, 124 (2020), <https://doi.org/10.1016/j.rser.2020.109790>
4. A. Rahnam, Z. Li and S. Sridhar, “Machine Learning-Based Prediction of a BOS Reactor Performance from Operating Parameters”, Processes 2020, 8, 371, [doi:10.3390/pr8030371](https://doi.org/10.3390/pr8030371)

5. S. Spooner, Z. Li and S. Sridhar, "Hidden phenomena during transient reaction trajectories in liquid metals processing", *Metallurgical and Materials Transactions B* . doi:10.1007/s11663-020-01880-2 (In Press)
6. L. Cao, Y. Zhao, S.Sridhar, H. Lei, G. Wang, "MgAl₂O₄ Inclusion Agglomeration on the Surface of Liquid Steel", *Metallurgical and Materials Transactions B*, 2019, DOI: 10.1007/s11663-019-01688-9,
7. Z. Cassinath, Z. Li, S. Sridhar, A. Das, H.R. Kotadia, "Microstructural modification of Sn–Bi and Sn–Bi–Al immiscible alloys by shearing", *Materials Science & Technology*, 2019, DOI: 10.1080/02670836.2019.1661659
8. S. Slater, K. Hechu, C. Davies and S. Sridhar, "Characterization of the Solidification of a Molten Steel Surface Using Infrared Thermography", *Metals*, 2019, 9, 126; doi:10.3390/met9020126
9. Z. Lifeng, R. Qiang, H. Duan, Y. Ren, Wei C., Cheng, W. Yang, S. Sridhar, "Modelling of non-metallic inclusions in steel", *Mineral Processing and Extractive Metallurgy Transactions of the Institutions of Mining and Metallurgy*, Volume 129, 2020 - Issue 2: Themed Issue on Modelling of Mineral and Metallurgical Processes, Pages: 184-206
10. Y. Wang, S.J. Clark, B. Cai, D. Venero, K. Yun, M. Gorley, E. Surrey, G. McCartney, S. Sridhar and P.D. Lee, "Small-Angle Neutron Scattering Reveals the Effect of Mo on Interphase Nano-Precipitation in Ti-Mo Micro-Alloyed Steels", *Scripta Mat.*, file:///Users/sseetharaman/Downloads/SSRN-id3441028.pdf, 2019
11. A. SenGupta, B. Santillana, S. Sridhar and m. Auinger "Transient Effect of Fluid Flow on Dendrite Growth Direction in Binary Fe-C Alloys Using Phase Field in OpenFOAM", *JOM*, <https://doi.org/10.1007/s1183>, May 2019, pp. 1-9
12. A. Rahnama and S. Sridhar, "Application of data science tools to determine feature correlation and cluster metal hydrides for hydrogen storage", *Materialia*, Vol. 7, 2019, <https://doi.org/10.1016/j.mtla.2019.100366>, pp. 2589-152
13. Y. Luo, M. Li, P. R. Scheller, S.Sridhar and L. Zhang, "Interaction Between Liquid Steel and AlN Substrate Containing Al-Y-Oxides", *Metallurgical and Materials Transactions B*, Accepted 2019
14. H.R. Kotadia, A. Rahnama, I.R. Sohn, J. Kim, S. Sridhar "Performance of dissimilar metal Self-Piercing Riveting (SPR) joint and coating behaviour under corrosive environment", *Journal of Manufacturing Processes* 39 (2019) 259–270
15. L. Cao, G. Wang, X. Yuan, S. Sridhar, "Thermodynamics and Agglomeration Behavior on Spinel Inclusion in Al-Deoxidized Steel Coupling with Mg Treatment", *Metals* 2019, 9, 900; doi:10.3390/met9080900

16. Q. Tian, G. Wang, X. Yuan , Qi Wang and S. Sridhar, “Complex Precipitates of TiN-MCx in GCr15 Bearing Steel”, *Metals* 2019, 9, 641; doi:10.3390/met9060641
17. J. Li, Juncheng, D. Bhattacharjee, , X. Hu, D. Zhang, Dianwei, S. Sridhar, Z. Li, “Effects of Slag Composition on H₂ Generation and Magnetic Precipitation from Molten Steelmaking Slag-Steam Reaction”, *Metallurgical and Materials Transactions B*, 2019, 50 (2), pp. 1023-1034
18. J. Li, Juncheng, D. Bhattacharjee, , X. Hu, D. Zhang, Dianwei, S. Sridhar, Z. Li, “Crystallization behavior of liquid CaO-SiO₂-FeO-MnO slag in relation to its reaction with moisture”, *Metallurgical and Materials Transactions B*, 50, 2019, pp. 1931–1948
19. K. Hechua, C. Slater, B. Santillana, S. Sridhar, “The use of infrared thermography to detect thermal instability during solidification of peritectic steels”, *Materials Characterization*, Volume 154, August 2019, Pages 138-147
20. P. Rozelle, S. Sridhar, P. B. Queneau and S. Thompson, “The Ni-converter – an historic perspective”, *Mineral Processing and Extractive Metallurgy*, 128:1-2, 125-133, DOI: 10.1080/25726641.2018.1527085
21. A. Rahnama and S. Sridhar, “Multiscale micromechanical model of duplex low density steel with B2 ordered precipitates”, *Mechanics of Materials*, Volume 131, April 2019, Pages 136-140
22. A. Rahnama, G. Zepon and S. Sridhar, “Machine Learning Based Prediction of Metal Hydrides for Hydrogen Storage, Part I: Prediction of Hydrogen Weight Percent”, *International Journal of Hydrogen Energy*, 44 (14), 7337-7344, 2019
23. A. Rahnama, G. Zepon and S. Sridhar, “Machine Learning Based Prediction of Metal Hydrides for Hydrogen Storage, Part II: Prediction of Material Class”, *International Journal of Hydrogen Energy*, 44 (14), 7345-7353, 2019
24. C. Slater, K. Hechu, C. Davis and S.Sridhar, "Characterisation of the Solidification of a Molten Steel Surface Using Infrared Thermography”, *Metals* 2019, 9, 126; doi:10.3390/met9020126
25. A. N. Assis, M. A. Tayeb, S. Sridhar and R.J. Fruehan, “Phosphorus Equilibrium Between Liquid Iron and CaO-SiO₂-MgO-Al₂O₃-FeO-P₂O₅ Slags: EAF Slags, the Effect of Alumina and New Correlation”, *Metals* 2019, 9, 116; doi:10.3390/met9020116
26. S.J. Clark, Y. Lan A. Rahnama, V. Janik and S. Sridhar “A Gibbs Energy Balance Model for Growth Via Diffusional Growth-Ledges” *ISIJ International*, Accepted 2018
27. A. Rahnama. H. Kotadia, S. Clark, V. Janik, S. Sridhar “Nano-mechanical properties of Fe-Mn-Al-C lightweight steels”, *Scientific Reports*, 2018, *Scientific REPORTS* | (2018) 8:9065 | DOI:10.1038/s41598-018-27345-w

28. A.Rahnama, S. Clark, S. Sridhar, “Machine learning for predicting occurrence of interphase precipitation in HSLA steels”, *Computational Materials Science* vol. 154 (2018) pp. 169–177
29. Y. Wang, S.J. Clark, R. Heenan, D. Alba-Venero, K. Callaghan, G. McCartney, S. Sridhar, P.D. Lee, “Investigating nano-precipitation in a V-containing HSLA steel using small angle neutron scattering”, *Acta Mat*, 2018, vol. 145, pp. 84-96
30. P. Sellamuthu, D. G. Harris Samuel, D. Dinakaran, V. P. Premkumar, Zushu Li 3 and S. Sridhar, “Austempered Ductile Iron (ADI): Influence of Austempering Temperature on Microstructure, Mechanical and Wear Properties and Energy Consumption”, *Metals* 2018, 8, 53; doi:10.3390/met8010053
31. S. Spooner, A. Rahmana, J. M. Warnett, M.A. Williams, Z.Li, and S. Sridhar “Quantifying the Pathway and Predicting Spontaneous Emulsification during Material Exchange in a Two Phase Liquid System”, *Scientific Reports*, 2017, Scientific **Reports** | 7: 14384 | DOI:10.1038/s41598-017-14638-9
32. A. Rahnama, S. Clark, V. Janik, S. Sridhar “A phase-field model investigating the role of elastic strain energy during the growth of closely spaced neighboring interphase precipitates”, *Computational Materials Science* , 2017, *Computational Materials Science*, 2018, Vol. 142, pp. 437-443
33. I. Papadimitriou, P. Efthymiadis, H.R. Kotadia, I.R. Sohn, S. Sridhar , “Joining TWIP to TWIP and TWIP to aluminium: A comparative study between joining processes, joint properties and mechanical performance”, *Journal of Manufacturing Processes*, 2017, Vol. 30, pp. 195-207
34. A. Rahnama, H. Kotadia, S. Sridhar, “Effect of Ni alloying on the microstructural evolution and mechanical properties of two duplex light-weight steels during different annealing temperatures: Experiment and phase-field simulation”, *Acta Materialia*, 2017, Vol. 132, pp. 627-643
35. C. Slater, K. Hechu and S. Sridhar, “Characterization of solidification using combined confocal scanning laser microscopy with infrared thermography”, *Materials Characterization*, 2017, Vol. 126, pp. 144-148
36. K. Hechu, C. Slater, B. Santillana, S. Clark, and S. Sridhar, “A novel approach for interpreting the solidification behaviour of peritectic steels by combining CSLM and DSC”, *Materials Characterization*, 2017, Vol. 133, pp. 25-32
37. S. Spooner, Z Li and S. Sridhar, “Spontaneous Emulsification as a Function of Materials Exchange” *Scientific Reports*, 2017, Scientific Reports | 7: 5450 | DOI:10.1038/s41598-017-05861-5, <https://www.nature.com/articles/s41598-017-05861-5.pdf>

38. A. Rahnama, S. Clark, V. Janik, S. Sridhar. “A Phase Field Model for Interphase Precipitation in V-micro-alloyed Structural Steels”, *Computational Materials Science*, 2017, Vol. 137, pp. 257-265
39. C. Slater, S. Spooner, C. Davis, and S. Sridhar, (2016). “Chemically Induced Solidification: A New Way to Produce Thin Solid-Near-Net Shapes”. *Metallurgical and Materials Transactions B*, 2016, Vol.47, Issue 6, pp 3221–3224
<http://doi.org/10.1007/s11663-016-0785-8>
40. S. Clark, Y. Lan, V. Janik, S. Sridhar “Interphase Precipitation – An Interfacial Segregation Model”, *ISIJ International*, 2016 Vol. 57, No. 3, pp. 524-532,
https://www.jstage.jst.go.jp/article/isijinternational/57/3/57_ISIJINT-2016-544/_pdf
41. H. Shibata and S. Sridhar “Professor Toshihiko Emi—Seeing is Believing”, *Metallurgical and Materials Transactions B*, 2016, Volume 47, Issue 4, pp. 2082–2082
42. J. Li, Juncheng, D. Bhattacharjee, X. Hu, D. Zhang, S. Sridhar, and Z. Li, “Development of a novel process for energy and materials recovery in steelmaking slags”, *Mineral Processing and Extractive Metallurgy*, 2017, Vol. 126, Issue 1-2, pp. 94-105,
<http://dx.doi.org/10.1080/03719553.2016.1259871>
43. S. Sridhar and Z. Li, “Can there be a sunrise in steel town?”, *Ironmaking and Steelmaking*, 2016, Vol. 43, Issue 9, pp. 642-649
44. P. Shen L. Zhang, Y. Wang, S. Sridhar, “Wettability between molten slag and dolomitic refractory”, *Ceramics International*, 2016, 42 (14), pp. 16040–16048
45. T. Amietszajew, S. Sridhar, R. Bhagat, “Metal recovery by electrodeposition from a molten salt two-phase cell system”, *J. Electrochem. Soc.*, 2016, Vol. 163, No. 9, pp. 515-521
46. A. Rahnama, S. Spooner, S. Sridhar, “Control of intermetallic nano-particles through annealing in duplex low density steel”, *J. Mat. Letters*, Vol. 189, 2017, pp. 13-16
<http://dx.doi.org/10.1016/j.matlet.2016.11.020>
47. A. Rahnama, R. Dashwood, S. Sridhar, “A phase-field method coupled with CALPHAD for the simulation of ordered k-carbide precipitates in both disordered c and a phases in low density steel”, *Computational Materials Science* 126 (2017) pp. 152–159
48. S. Clark, L. Yan, V. Janik, A. Rijkenberg, S. Sridhar, “In situ characterization of Austenite/Ferrite transformation kinetics and modeling of interphase precipitation inter sheet spacing in V micro alloyed HSLA steels”, *Materials Science Forum*, 2016, Vol. 879, pp. 356-362
49. S. Spooner, J. Warnett, R. Bhagat, M. Williams, S. Sridhar, “Calculating the Macroscopic Dynamics of Gas/Metal/Slag Emulsion during Steelmaking”, *ISIJ International*,
https://www.jstage.jst.go.jp/article/isijinternational/advpub/0/advpub_ISIJINT-2016-361/_pdf

50. Z. Wang, Y. Sun, S. Sridhar, M. Zhang, Z. Zhang, “Investigation on Viscosity and Nonisothermal Crystallization Behavior of P-Bearing Steelmaking Slags with Varying TiO₂ Content”, *Metallurgical and Materials Transactions B*
<http://link.springer.com/article/10.1007/s11663-016-0825-4>
51. Q. Wang, L. Zhang and S. Sridhar, “Modeling on Fluid Flow and Inclusion Motion in Centrifugal Continuous Casting Strands”, *Metallurgical and Materials Transactions B*, 2016, Vol. 47, no. 4, pp. 2623–2642
52. S. Spooner, A.N. Assis, J. Warnett, R.J. Fruehan, M.A. Williams, S. Sridhar, “Investigation into the Cause of Spontaneous Emulsification of a Free Steel Droplet; Validation of the Chemical Exchange Pathway”, *Metallurgical and Materials Transactions B*, 2016, Vol. 47, no. 4, pp 2123–2132
53. C. Slater, S. Spooner, C. Davies, S. Sridhar, “Observation of the reversible stabilization of liquid phase iron during nitriding”, *Materials Letters*, 2016, Volume 173, 15, pp 98-101
54. S. Clark, V. Janik, A. Rijkenberg, S. Sridhar, “Analysis of the extent of interphase precipitation in V-HSLA steels” through in-situ characterization of the γ/α transformation”, *Materials Characterization*, 2016, vol. 115, pp. 83–89
55. J. Bott, H. Yin, S. Sridhar and M. Auinger, “Influence of Gas Composition and Exposure Cycle on the Formation of Surface and Subsurface Oxides in Iron-Aluminum-Based Alloys at High Temperatures”, *Metallurgical and Materials Transactions B*, 2016, published online <http://link.springer.com/article/10.1007/s11663-016-0671-4/fulltext.html>
56. Q. Wang, L. Zhang, S. Sridhar, S. Yang, W. Yang, Y. Wang. “Detection of Non-metallic Inclusions in Centrifugal Continuous Casting Steel Billets”, *Metallurgical and Materials Transactions B*, 2016, 2016, Volume 47, Issue 3, pp 1594-1612
57. A. Kamyabi-Gol, S.J. Clark, J.W. Gibbs, S. Sridhar, P.F. Mendez, “Quantification of evolution of multiple simultaneous phase transformations using dilation curve analysis (DCA)”, *Acta Materiala*, 102, 2016, pp. 231-240
58. Y. Sun, S. Sridhar, S. Seetharaman, H. Wang, L. Liu, X. Wang and Z. Zhang, “A Fe-C big cycle in modern carbon-intensive industries: towards emission reduction and resource utilization”, *Scientific Reports*, | 6:22323 | DOI: 10.1038/srep22323, <https://www.nature.com/articles/srep22323.pdf>
59. Z. Wang, Y. Sun, S. Sridhar, M. Zhang, M. Guo, Z. Li, Z. Guo, Z. Zhang, “Viscous Flow and Crystallization Behaviors of P-bearing Steelmaking Slags with varying Fluorine Content”, *ISIJ International*, 2015, Vol. 56, No. 4, pp. 546-553

60. Y. Zhang, L. Xu, S. Sridhar, L. Liu, Z. Wang, Z. Zhang, "Effects of chemistry and mineral on structural evolution and chemical reactivity of coal gangue during calcination: towards efficient utilization", *Materials and structures*, 2015, Vol. 48, pp. 2779-2793
61. I.R. Sohn, J.-S. Kim and S. Sridhar, "Effect of Dew Point and Gas Flow Rate on the Surface Oxidation of Advanced High Strength Steels" , *ISIJ International*, 2015, Vol. 55, No. 9, pp. 2008–2017
62. M. A. Tayeb, A. N. Assis, S. Sridhar and R. J. Fruehan, "MgO Solubility in Steelmaking Slags", *Metallurgical and Materials Transactions B*, 2015, 46B (No. 3), pp. 1112-1114
63. A. N. Assis, M. A. Tayeb, S. Sridhar, R. J. Fruehan "Phosphorus Equilibrium Between Liquid Iron and CaO-SiO₂-MgO-Al₂O₃-FeO-P₂O₅ Slag Part 1: Literature Review, Methodology and BOF Slags", *Metallurgical and Materials Transactions B*, 46B, 2015, pp 2255-2263
64. V. Janik, P. Beentjes, D. Norman, G. Hensen, S. Sridhar "Role of Heating Conditions on Micro-crack formation in zink coated 22MnB5", *Metallurgical and Materials Transactions A*, 2016, Volume 47, Issue 1, pp 400-411
65. T. Amietszajew, S. Sridhar, R. Bhagat, "The Solubility of Specific Metal Oxides in Molten Borate Glass", Accepted for publication in *J. American Ceramic Society*, Vol. 98, Issue 10, 2015, pp. 2984–2987
66. Y. Sun, S. Sridhar, L. Liu, X. Wang and Z. Zhang, "Integration of coal gasification and waste heat recovery from high temperature steel slags: an emerging strategy to emission reduction", *Scientific Reports* | 5:16591 | DOI: 10.1038/srep16591
67. Z.J. Wang, Y.Q. Sun, S. Sridhar, M. Zhang, M. Guo, and Z.T. Zhang , "Selective Crystallization Behavior of CaO-SiO₂-Al₂O₃-MgO-Fe₁O-P₂O₅ Steelmaking Slags Modified through P₂O₅ and Al₂O₃", *Metallurgical and Materials Transactions B*, 46B, 2015, pp 2246-2254
68. A. Assis, J. Warnett, S. Spooner, R.J. Fruehan, M. Williams, S. Sridhar, "Spontaneous Emulsification of a Metal Drop Immersed in Slag Due to Dephosphorization: Surface Area Quantification", *Metallurgical and Materials Transactions* 46B, 2014, pp. 568-576
69. Z.J. Wang, Y.Q. Sun, S. Sridhar, M. Zhang, M. Guo, and Z.T. Zhang, "Effect of Al₂O₃ on the Viscosity and Structure of CaO-SiO₂-MgO-Al₂O₃-Fe₁O Slags", *Metallurgical and Materials Transactions B*, 2014, *Metallurgical and Materials Transactions B*, Volume 46B, 2015, pp. 537-541
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5.B Papers in Symposium or Conference Proceedings Fully Reviewed Prior to Publication

1. E. Schmidt, E. B. Damm and S. Sridhar: „On the rate and Mechanism of Interface Migration during Austenitization of 4118 Steel”, An International Conference on New Developments in Long and Forged Products: Metallurgy and Applications, Association for Iron and Steel Technology, Warrendale, PA, June 2006, pp. 203-215
2. E. Schmidt and S. Sridhar: "Direct observation of austenite formation and decomposition in 4118 and 4320 steels", Solid-to-Solid Phase Transformations in Inorganic Materials 2005, May 29-June 3, Phoenix (Az), Volume 2, Edited by: J. Howe, D.E. Laughlin, J.K. Lee, U. Dahmen and W.A. Soffa, TMS, Warrendale (PA), 2005, pp. 551-568
3. G.N. Shannon and S. Sridhar: "Separation of Al₂O₃ inclusions across interfaces between molten steel and ladle-, tundish- and mold slags", EPD Congress 2005, TMS Annual Meeting, SanFrancisco, CA, Edited by M.E. Schlesinger, Published by TMS, Warrendale, PA

4. G.N. Shannon and S.Sridhar: "Separation of Al₂O₃ inclusions across interfaces between molten steel and ladle-, tundish- and mold slags", Proceedings of the Metal Separation Technologies III: ntain, Colorado, June 20 a symposium in honor of Professor Lauri E. Holappa, EF conference, Copper Mou -24, 2004, Editors in Chief: R.E. Aune and M. Kekkonen, pp. 259-268
5. N.J. McDonald and S. Sridhar: "The peritectic reaction in Fe-Co alloys", Proceedings of Solidification Processes and Microstructures, A Symposium in Honor of Wilfred Kurz, Edited by: M. Rappaz, C. Beckermann, R. Trivedi, March 14-18, 2004, Charlotte, NC, TMS, Warrandale, PA, pp. 233-238
6. S. Sridhar and A.W. Cramb: "Direct visualization of phenomena related to steel casting and solidification", Proceedings of Solidification Processes and Microstructures, A Symposium in Honor of Wilfred Kurz, Edited by: M. Rappaz, C. Beckermann, R. Trivedi, March 14-18, 2004, Charlotte, NC, TMS, Warrandale, PA, pp. 139-144
7. Y. Wang, C. Thorning, S. Sridhar, D.M. Haezebrouck and T. Simpson: "Surface Oxide Evolution on Cold Rolled C-Mn-Si-Al TRIP Steels", published in the Proceedings of the International Conference on Advanced High Strength Sheet Steel for Automotive Applications", June 2004, Golden Colorado, AIST, Warrendale, PA
8. G. Shannon, Y. Wang, S. Vantilt, B. Coletti, B. Blanpain and S. Sridhar: "Observation of behavior of oxide inclusions at molten slag/steel interfaces", Proceedings of the VII International Conference on Molten Slags, Fluxes and Salts, January 2004, Cape Town (SA), The South African Institute of Mining and Metallurgy Symposium Series S36, Johannesburg (SA), pp. 571-576
9. R.E. Aune, M. Hayashi, and S. Sridhar: "A thermodynamic approach to physical properties of silicate melts", Proceedings of the VII International Conference on Molten Slags, Fluxes and Salts, January 2004, Cape Town (SA), The South African Institute of Mining and Metallurgy Symposium Series S36, Johannesburg (SA), pp. 517-529
10. N.J. McDonald and S. Sridhar: "Peritectic reaction in the Fe-C, Fe-Ni and Fe-Cr-Ni Systems", Proceedings of the Austenite formation and Decomposition Conference, October 2003, Chicago, IL (USA), TMS, pp. 381-393
11. S. Sridhar, C.W.J. Cheong and P.D. Lee: "Experimental Studies of the Evolution of Cast Microstructures and Defects", *Proceedings of the 2nd International Al Casting Conference*, October 2002, Columbus, Ohio (USA), ASM International
12. S. Sridhar and A.W. Cramb: "Properties of Slags and Their Importance in Manufacturing Clean Steels", *Proceedings of the Mills Symposium, Metals, Slags, Glasses: High Temperature Properties & Phenomena*, Volume I, August (2002), London (UK), The Institute of Materials

13. S. Sridhar: "Interfacial phenomena in clean steel processing", *Proceedings of the International Conference on Science and Technology of Interfaces in Honor of Dr. Bhakta Rath*, TMS (2002) Annual Meeting in Seattle, Washington, USA
14. M. Valdez, K. Prappakorn, A.W. Cramb and S. Sridhar, "A Study of the Dissolution of Alumina Particles in CaO-Al₂O₃-SiO₂-MgO slags (1)", *Proceedings of the 13th LAS Steelmaking Seminar, 3rd LAS Ironmaking Seminar & 3rd ISS Argentina Section Meeting*, October 29-31 and November 1st, 2001, Buenos Aires, Argentina
15. Gerogiorgis, Dimitrios I., B. Erik Ydstie and Sridhar S. Seetharaman, "A Steady State Electrothermic Simulation Analysis of a Carbothermic Reduction Reactor for the Production of Aluminum", *Proceedings of the Computational Modeling Symposium*, San-Diego, CA September 23rd-26th, TMS, Warrendale
16. K. C. Mills, A.B. Fox, P.D.Lee, S. Sridhar, "Modeling mold powder behavior in the continuous casting mold", *Proc. ICS 2001, 2nd International Congress on the Science & Technology of Steelmaking*. 2001. Swansea, Wales, Institute of Materials, pp. 445 – 456
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20. C.F. Orrling, S.Sridhar and A.W. Cramb, "In situ observations of inoculation and crystallization in synthetic slags", *Proceedings on the 6th International Conference on Molten Slags, Fluxes and Salts*, Stockholm, Sweden, (2000)
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22. K.C. Mills and S. Sridhar, "Interfacial effects in iron and steelmaking", *Proceedings of the Belton Memorial Symposium*, ISS, Sydney, AU, (2000)
23. S. Sridhar, A.E. Giannakopoulos, S. Suresh and U. Ramamurty, "Indentation of piezoelectric ceramics: experiments, analysis and applications", *MRS proceedings of Smart Materials*, Boston, MA (1999)

24. S. Seetharaman, S. Sridhar, Du Sichen and K. C. Mills, "Correlation between viscosities and thermodynamics of molten slags", *Proceedings of the international symposium on thermophysical properties*, Singapore (1999)
25. X. Xu, R. Atwood, S. Sridhar, P.D. Lee and M. Mclean, "A comparison between micro-modelling approaches" *Proceedings of the Symposium on Liquid Metal Processing and Casting*, Santa Fe, NM (1999)
26. K.C. Mills and S.Sridhar, "The effect of interfacial phenomena on phase separation in materials processing", *Proceedings of the Engineering Foundation conference on Metal Separation Technologies Beyond 2000*, Honolulu, Hawaii (1999)
27. S. Sridhar, K.C. Mills, V. Ludlow and T. Mallaband, "A comparison of mould powders used to cast slabs, billets and blooms", *Proceedings of the 3rd European Conference on Continuous Casting* (1998)
28. S. Sridhar, V. Stancovski and U.B. Pal, "Effect of direct current on oxygen transfer across YSZ-Pt interfaces", *Proceedings of the Fifth International Solid Oxide Fuel Cell Symposium* (1997) Edited by: U. Stimming, S.C. Singhal, H. Tagawa and W. Lehnert.
29. S. Sridhar, K.C. Chou and U.B. Pal, "Evaluation of the thermodynamics and kinetics of catalytic steam reforming over SOFC anode materials", *Proceedings of the Fourth International Solid Oxide Fuel Cells Symposium* (1995) Edited by: M.Dokiya, O.Yamamoto, H.Tagawa and S.C.Singhal.
30. Y. Zheng, S. Sridhar and K.C. Russell, "Controlled porosity alloys through solidification processing: A modeling study", *Materials Research Symposium Proceedings* (1995) Vol. 371, pp. 365-370.
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32. S. Sridhar and K.C. Russell, "Optimization of alloy chemistry for porous materials", *Proceedings of the International Conference on Advances in Physical Metallurgy* (1994) ICPM-94 Bombay, India.
33. R.E. Aune, S. Sridhar and Du Sichen, "Thermodynamic Study of the Ni-W-O system in the temperature range 1073-1273 K", *Proceedings of the EPD Congress* (1994) Edited by G.W. Warren, pp. 815-829.
34. S. Sridhar and K.T. Jacob, "A new matched thermochemical diagram for vacuum refining of nickel and cupronickel alloys", *Proceedings of the Paul E. Queneau International Symposium* (1993) Edited by R.G. Reddy and R.N. Weizenbach, pp. 41-58.

5.C Other Papers in Symposium or Conference Proceedings

1. C. Wang and S. Sridhar “De-oxidation in Fe-Al-Ti-O melts at 1973 K”, Sanyo Technical Report, Vol 16, No. 1, 2009
2. S. Sridhar and A.W. Cramb “Foreword to the R.J. Fruehan Symposium Special Issue”, *Met. And Mat. Trans*, 2012
3. E. Schmidt and S. Sridhar: “Direct Observations of Austenite Formation and Decomposition in 4118 and 4320 Steels”, Symposium on Long Bar Products, TMS Fall Meeting, September 2005, Pittsburgh (PA), TMS, Warrendale (PA)
4. C. Thorning and S. Sridhar: “Oxide Scale Formation on TRIP Steel Surfaces”, AIST Tech, May 2005, Charlotte, NC, 2005, AIST, Warrendale (PA)
5. S. Sridhar: “Application of Confocal Scanning Laser Microscopy to Steel Research”, The 3rd International Congress on the Science and Technology of Steelmaking, Charlotte, NC, May 2005, AIST, Warrendale (PA)
6. M. E. Valdez, H. Shibata, S. Sridhar and A.W. Cramb: “The Solidification Rate of Undercooled Pure Iron”, Proceedings of the Continuous Casting Fundamentals Conference, Materials Science & Technology 2004, September 26-29, 2004, New Orleans, Louisiana, published by TMS, Warrandale (PA)
7. N. McDonald and S. Sridhar: “The Effect of Phase Diagram Information on Modeling Peritectic Reaction Rates”, Proceedings of the Continuous Casting Fundamentals Conference, Materials Science & Technology 2004, September 26-29, 2004, New Orleans, Louisiana, published by TMS, Warrandale (PA)
8. N. McDonald and S. Sridhar: “Observations of Hypo and Hyper Peritectic Solidification in the Iron-Nickel System”, *Proceedings of ISS Tech 2003*, Indianapolis, In, (2003), ISS, Warrendale
9. Y. Wang, A. Gomez, C. Cicutti, A.W. Cramb and S. Sridhar: “Re-oxidation of low-carbon aluminum-killed steel”, 14th IAS Steelmaking Conference, 4th IAS Ironmaking Conference & 1st IAS/AWS Welding Meeting, November 2003, San Nicolas, Argentina, pp. 653-662
10. M. Valdez, K. Prapakorn, S. Sridhar and A.W. Cramb: “Dissolution of inclusions in steelmaking slags”, *Proceedings of ISS Tech 2003*, Indianapolis, In, (2003), ISS, Warrendale
11. Y. Wang and S. Sridhar: “The Behavior of Al₂O₃-CaO Inclusions in Low-Carbon Al-Killed Steel During Solidification”, *Proceedings of the Electric Arc Furnace Conference*, San Antonio, Texas (2002), ISS, Warrendale

12. N. McDonald and S. Sridhar: "Peritectic Solidification in the Hypoperitectic Iron-Nickel System", *Proceedings of the Electric Arc Furnace Conference*, San Antonio, Texas (2002), ISS, Warrendale
13. Alistair B Fox, Kenneth C Mills, S Sridhar and Peter D. Lee: "Mold Powder Estimation Models for Continuous Casting": *Proceedings of the 85th Steelmaking Conference*, Nashville, Tennessee, (2002), ISS, Warrendale
14. Y.Wan, M. Valdez and S. Sridhar: "Behavior of liquid and solid inclusions at advancing cellular fronts during the solidification of steel", *Proceedings of the Electric Arc Furnace Conference*, Phoenix, Arizona (2001), ISS, Warrendale
15. Gerogiorgis, Dimitrios I., Sridhar S. Seetharaman and B. Erik Ydstie, "Thermophysical Property Modeling for Multicomponent Molten Slags at High Temperatures" *Proceedings of the 3rd Panhellenic Chemical Engineering Conference*, NTUA, Athens, Greece, June 2001
16. K. Prappakorn, S. Sridhar and A.W. Cramb: "Comparison of methods for measuring crystallization in slags" *Proceedings of the 84th Steelmaking Conference*, Baltimore, Maryland (2001), ISS, Warrendale
17. C. Orrling, S. Sridhar and A.W. Cramb: "Crystallization phenomena in slgs" *Proceedings of the Electric Arc Furnace Conference*, Orlando, Florida (2000), ISS, Warrendale
18. C. Tse, S.H. Lee, S. Sridhar and A.W. Cramb, "In-situ observations of clean steel phenomenon", *Proceedings of 83rd Steel Making Conference*, ISS, Pittsburgh, (2000)
19. S. Sridhar, V. Stancovski and U.B. Pal,"Electrocatalytic effects of ionic, electronic and mixed conducting phases on internal steam reforming in SOFC anodes, *Proceedings of the 1996 EPRI/GRI Fuel Cell Workshop*.
20. S. Sridhar and U.B. Pal, "Evaluation of the thermodynamics and kinetics of catalytic steam reforming over SOFC anode materials", *Proceedings of the 1995 EPRI/GRI Fuel Cell Workshop*.

5.D Sections or Chapters in Edited Monographs or Similar Volumes

1. Editor of 3 parts of "Treatise on Process Metallurgy", Elsevier, 2013
2. J. Nakano, K. Kwong, J.P. Bennett, T.K. Kaneko, S. Sridhar, "The Characterization of Non-Volatile Impurities in Mixed Carbon Feedstock and their Interactions with Gasifier Liner Materials," *Gasification: Chemistry, Processes and Applications*, 329- 356, New York: Nova Science Publishers Inc (2011).
3. S. Sridhar and A.W. Cramb: "Recent advances in solidification", Elsevier Science and Technology

4. S. Sridhar: "Physical properties relevant for continuous casting", The Making, Shaping and Treating of Steel", AISE (Handbook for Steelmaking).
5. H.Y. Sohn and S. Sridhar: "High Temperature Processes", Chapter 2 in "Fundamentals of Metallurgy", published 2005 by Woodhead Publishing, Cambridge, UK, pp. 3-37
6. S. Sridhar and H.Y. Sohn: "Kinetics of Metallurgical Reactions", Chapter 9 in "Fundamentals of Metallurgy", published 2005 by Woodhead Publishing, Cambridge, UK, pp. 270-349
7. M. McGuire and S. Sridhar: "Handbook of Stainless Steel", Under preparation, to be completed 2007 and published by ASM International.

6.E Patents

1. Control System for Catalytic Processes US 7,325,392 B2
2. Method for Casting by a Float Glass Process and Associated Processes US 9,050,652 B2
3. Process for recovering metals and an electrolytic apparatus for performing the process US 9,150,973

7. Professional Activities

7.A Selected Seminars and Short Courses

1. "Porosity formation during Al-casting", Lehigh University, Department of Materials Science and Engineering (1999)
2. "Indentation of piezoelectric ceramics", Rutgers University, Department of Ceramics, (1999)
3. "High temperature metals processing", Carnegie Mellon University, (2000)
4. "In-situ observation in liquid metals processing", 11/10/2000 *Colloquium Series*, Indiana University of Pennsylvania, Department of Physics, (2000)
5. "Production of Clean Metals", *Undergraduate Materials Seminar*, Carnegie Mellon University, (2000)
6. "*In-Situ* Studies of High Temperature Materials Processes: Observing, Modeling and Understanding", 09/26/2001 Max Planck Institute for Iron Research, Dusseldorf, Germany, (2001)

7. "Steel cleanliness issues related to oxide inclusions", 9/24/2001 *Oxygen in Steelmaking: Towards Cleaner Steels*, Institute of Materials, London, UK (2001)
8. "In-Situ Studies of High Temperature Materials Processes: Seeing, Modeling and Believing", 08/21/2001 Naval Research Laboratory, Washington D.C., (2001)
9. "Understanding and Modeling High Temperature Materials Processes", 10/26/2001 Bethlehem Steel Company, Homer Research Laboratory, Bethlehem, PA, (2001)
10. "The Evolution of Inclusions", 7/9/2002, Institute für Eisenhüttenkunde, RWTH, Aachen, Germany
11. "The Evolution of Inclusions during Steelmaking and Casting", 7/16/2002, *Unterausschuss für physikalische Chemie*, VDEh, Düsseldorf, Germany
12. "The Evolution of Inclusions and Steel Microstructures during Steelmaking and Casting", 10/29/2002 Ispat-Inland Steel, Research Center, In, USA
13. "Direct Visualization of Metallurgical Phenomena", University of Alabama, Department of Metallurgical and Materials Engineering, 10/24/2003
14. "Metallurgical Reactions and Transformations", NUCOR, Berkeley, SC, 05/22/2005
15. "Ongoing and Future Research at CISR", Arcelor Research Center, Metz, France, 01/16/06
16. "Dynamic Issues Related to Inclusion Generation, Evolution and Control", KTH, Dept. of Materials Science and Engineering, Stockholm, Sweden, 01/14/06
17. "Oxidation and Decarburization in TRIP steels", University of Toronto, Department of Materials Science and Engineering, Toronto, Canada, 05/29/06
18. "Applications of CSLM at the Center for Iron and Steelmaking Research", POSCO Research Center, Pohang, Korea, 8/29/07
19. "CISR-Research on Hot Shortness", Gerdau-Ameristeel, Quality Managers Meeting, Tampa, Florida, 10/10/2007
20. "Studies on Interactions Between Particles and Interfaces – Modeling and Visualization", Nippon Steel Research Laboratories, Kimitsu, Japan, September 30th, (2008)
21. "Interaction between melts and particles", JFE Steel, Research Center, West Japan Works, Fukuyama, Japan, September 26th, (2008)
22. "Studies on Interactions Between Particles and Interfaces – Modeling and Visualization", Sanyo Special Seel, Himeji, Japan, October 10th, (2008)

23. "Effect of Impurities on the Distribution of copper-rich phases during oxidation of Fe alloys and recycled low carbon steels", China Steel, Taiwan, Kaohsiung, July 2009
24. "An Update of Ongoing Research at CIST", POSCO-POSLAB, Pohang, Korea, July 2009
25. "Ti-Inclusion Evolution During Ladle Processing and Solidification", Chinqing University, Department of Metallurgy, China, July 2009
26. "Ti-Inclusion Evolution During Ladle Processing and Solidification", University of Science and Technology, Beijing, July 2009
27. "Effect of Impurities on the Distribution of copper-rich phases during oxidation of Fe alloys and recycled low carbon steels", Peking University, School of Energy and Resource Engineering, Beijing, China July 2009
28. "Interfacing Chemical and Physical Metallurgy", J.F. Elliott Award Lecture Talk, November 14th, 2011, Illinois Institute of Technology, Chicago, IL, USA
29. "Interfacing Chemical and Physical Metallurgy", J.F. Elliott Award Lecture Talk, October 12th, 2011, University of Missouri Rolla, MO, USA
30. "Interfacing Chemical and Physical Metallurgy", J.F. Elliott Award Lecture Talk, October 12th, 2011, Clemson University, SC, USA
31. "Interfacing Chemical and Physical Metallurgy", J.F. Elliott Award Lecture Talk, June 22nd, 2011, Royal Institute of Technology, Stockholm, Sweden
32. "The Importance of Transient Reactions in Steel Melts", POSCO-POSLAB, Pohang, Korea, June 30th, 2012
33. "Hot-Shortness in Steels", POSCO-POSLAB, Pohang, Korea, June 30th, 2012
34. "Sustainability in Primary Metals Manufacture", University of Science, Technology of Beijing, Beijing, P.R. China, May 27th, 2012
35. "Seminar on Inclusions & Slags", TATA Steel R&D, Ijmuiden 12th July 2013, NL
36. "Industrial short course on clean steel", USTB, August, 2013, P.R. China
37. "Industrial short course on Inclusion formation, evolution and separation", TATA Steel R&D Laboratories, Jamshedpur, December, 2013, India
38. "Industrial short course on clean steel", USTB, August, 2014, P.R. China
39. "Flexibility - The key to sustainability in steel manufacturing", Jiangxi University of Science and Technology, October 18th, 2014

40. “Flexibility - The key to sustainability in steel manufacturing”, Shanghai University, October 23th, 2014
41. “Flexibility - The key to sustainability in steel manufacturing”, TATA Steel Colloquium, October 9th, 2014

7.B. Selected Conference Presentations

1. “Recycling High-Residual Scrap in EAF – Fundamental Research Aimed at pushing the limits”, Science and Technology of Iron and Steelmaking”, Jamshedpur, December 16-18, 2013, **Invited**
2. “Research on Iron and Steel Manufacturing – What is left to do from an Academic Perspective?”, Pittsburgh, TMS Fall Meeting, Young Leaders Luncheon Talk, **Invited**
3. “Clean Steel and Prof. Hae-Geon Lee’s Contributions”, Clean Steel of the Future – The Hae-Geon Lee Symposium, GIFT-POSTECH, S. Korea, June 1st, 2012, **Invited**
4. “The effects of alloying elements on initial iron oxidation, interface stability and hot-shortness”, Gordon Research Conference on High Temperature Corrosion, July 26th, 2011, New London, NH, **Invited**
5. “Studies on Slags and their Reactions with Other Phases”, Rod Guthrie Honorary Symposium, Montreal, Canada, June 8th, 2011, **Invited**
6. “Studies on the Effect of Residuals on Hot Shortness”, TENARIS Distinguished Webinar Series, April 11th, 2011, **Invited**
7. “Effects of Residual Elements Arsenic, Antimony and Tin on Surface Hot Shortness”, ASM Night Lecture, April 21th, 2011, Pittsburgh, PA, USA, **Invited**
8. “The Importance of Transient Reactions in Iron Melts”, Symposium for Rob Boom, March 26, 2011, Ijmuiden, Netherlands, **Invited**
9. “A Study of Transient Ladle Reactions in Iron Melts Involving Aluminum, Titanium and Oxygen – Effects of Al/Ti ratio”, Pittsburgh, MS&T, 2009, Session on Clean Steel during Oct.25-29, 2009, Pittsburgh, PA, USA, **Invited**
10. “Micro structure refinement in high Mn, Heavy Plate Steels”, 156th ISIJ Meeting, Advances in Studies of Inclusion/Precipitates Behavior Related to Microstructure Control, Kumamoto, Japan, ISIJ Symposium, September 24, 2008 , **Invited**
11. “A study of transient reactions in ladles involving iron, aluminum, titanium and oxygen”, Sano Symposium, Tokyo, Japan, October 2, 2008, **Invited**
12. “Distribution of copper-rich phases during oxidation of Fe alloys and recycled low carbon steels”, ICS2008, Gifu, Japan, October, 2008
13. “Ti in the Ladle - Friend or Foe?”, ATS International Steelmaking Conference, Paris, France 13-14 December, 2007, session on Physical Chemistry of steelmaking

14. "The Removal of Inclusions by Slags During Steel Production", European Conference on Advanced Materials and Processes, EUROMAT 2007, Nurnberg, Germany, 10-13 September 2007, **Invited**
15. "Ti Additions in the Ladle - Transient Reactions and Microstructure Refinement", POSCO Technology Conference, Postech, Korea, 8/31/07, **invited**
16. "The Ability of Slags to Absorb Non-Metallic Inclusions", ISIJ Meeting, Hiroshima, Japan, September, 2005, 27-30, **invited**
17. "Direct observation of austenite formation and decomposition in 4118 and 4320 steels", Solid-to-Solid Phase Transformations in Inorganic Materials 2005, May 29-June 3, Phoenix (Az), **invited**
18. "Application of Confocal Scanning Laser Microscopy to Steel Research", The 3rd International Congress on the Science and Technology of Steelmaking, Charlotte, NC, May 2005, AIST, Warrendale (PA), **keynote**
19. "Oxide Scale Formation on TRIP Steel Surfaces", AIST Tech, May 2005, Charlotte, NC, 2005, AIST, Warrendale (PA)
20. "A study of Non-Isothermal Austenite Formation and Decomposition Steels", The Hillert Symposium - Thermodynamics and kinetics of migrating interfaces in steels and complex alloys, December 2 - 3, 2004, The Swedish Society for Materials Technology and The Royal Institute of Technology, Stockholm, Sweden (2004)
21. "Direct visualization of re-oxidation phenomena on surfaces of molten steels and at interfaces between molten steels and slags", 03/31/04, High Temperature Capillarity 2004 (HTC 2004), San Remo , Italy, (2004)
22. "Surface oxide evolution on cold rolled Si/Al TRIP steels", International Conference on Advanced High Strength Sheet Steel for Automotive Applications", June 2004, Golden Colorado, AIST, Warrendale, PA (2004)
23. "Clustering, Agglomeration, Pushing and Engulfment at Molten Metallurgical Interfaces", 2/21/2002 *Proceedings of the International Conference on Science and Technology of Interfaces in Honor of Dr. Bhakta Rath*, TMS Annual Meeting in Seattle, Washington, USA, (2002)
24. "Experimental Studies of the Evolution of Cast Microstructures and Defects", 10/07/2002, 2nd *International Al Casting Conference*, Columbus, Ohio (USA), ASM International
25. "Properties of Slags and Their Importance in Manufacturing Clean Steels", *Mills Symposium, Metals, Slags, Glasses: High Temperature Properties & Phenomena*, August (2002), London (UK), The Institute of Materials

26. "Behavior of liquid and solid inclusions at advancing cellular fronts during the solidification of steel", 11/12/2001 *Electric Arc Furnace Conference*, Foundry operations session, Phoenix, Arizona (2001), ISS, Warrendale
27. "Steel cleanliness issues related to oxide inclusions", 9/24/2001 *Oxygen in Steelmaking: Towards Cleaner Steels*, Institute of Materials, London,UK (2001)
28. "In-situ observations of clean steel phenomenon", 03/27/2000, *83rd Steel Making Conference*, ISS, Pittsburgh, (2000)
29. "Separation and dissolution of alumina inclusions at slag/metal interfaces", 06/13/2000 *6th International Conference on Molten Slags, Fluxes and Salts*, Stockholm, Sweden, (2000) (Keynote Paper)
30. "Indentation of piezoelectric ceramics: experiments, analysis and applications", *MRS Symposium on Smart Materials*, Boston, MA (1999)

Teaching and Education

8.A Courses Taught at CMU

My course ratings (see table FCE values below, on a scale from 0 to 5) have been consistently well above the college averages (<http://www.cmu.edu/uca/index.html>).

| Course Number | Course Title | Units | Class | Num of Students | Offered | FCE Ratings: Course | FCE Ratings: Instr |
|---------------|---|-------|---------------|-----------------|---------|---------------------|--------------------|
| 27-322A | Processing Metals(b) | of 9 | Jr, Sen | 7 | Fall 00 | 4.86 | 5 |
| 27-216A | Transport Materials(b) | in 9 | Soph, Jr, Fr | 36 | Spr. 00 | 4.52 | 4.76 |
| 27-322A | Processing Metals(b) | of 9 | Jr, Soph, Sen | 25 | Fall 01 | 4.53 | 4.74 |
| 27-216A | Transport Materials(b) | in 12 | Soph | 10 | Spr. 01 | 4.63 | 4.75 |
| 27-794 | Electrochemical Processes in Materials(b) | 12 | Grad. | 6 | Fall 02 | 5 | 4.75 |

| | | | | | | | |
|---------|--|-------|---------------|----|-----------|------|------|
| 27-594A | Electrochemical Processes in Materials(a) | 9 | Jr, Sen | 9 | Fall 02 | 4.86 | 4.86 |
| 27-216A | Transport Materials(b) | in 12 | Soph | 25 | Spr. 03 | 4.70 | 4.75 |
| 27-594A | Electrochemical Processes in Materials(a) | 9 | Jr, Sen | 9 | Fall 03 | 4.86 | 4.86 |
| 27-766 | Diffusion Solids | in 6 | Grad. | 23 | Fall 03 | 4.32 | 4.27 |
| 27-766 | Diffusion Solids | in 6 | Grad. | 18 | Fall 04 | 3.8 | 4.4 |
| 27-216A | Transport Materials(b) | in 12 | Soph | 18 | Spr. 05 | 4.6 | 4.6 |
| 27-766 | Diffusion Solids | in 6 | Grad. | 21 | Fall 05 | 4.5 | 4.9 |
| 27-594A | Electrochemical Processes in Materials(a) | 9 | Jr, Sen, Grad | 15 | Fall 05 | 4.4 | 4.9 |
| 27-766 | Diffusion Solids | in 6 | Grad. | 21 | Fall. 06 | 4.3 | 4.5 |
| 27-216A | Transport Materials(b) | in 9 | Soph | 29 | Spr. 07 | 4.6 | 4.8 |
| 27-592 | Solidification of Metals (b) | of 12 | Sen, Grad | 10 | Spr. 07 | 4.8 | 5.0 |
| 27-995 | Metals (b) | | | | | | |
| 27-766 | Diffusion Solids | in 6 | Grad | 21 | Fall 09 | 4.1 | 4.4 |
| 27-594 | Electrochemical degradation of materials | 9 | Jr, Sen, | 22 | Fall 09 | 4.2 | 4.4 |
| 27-216A | Transport Materials(b) | in 9 | Soph | | Spring 10 | 4.40 | 4.33 |
| 27-766 | Diffusion Solids | in 6 | Grad. | | Fall 10 | 4.11 | 4.17 |
| 27-216A | Transport Materials(b) | in 9 | Soph | | Spring 11 | 4.67 | 4.76 |
| 27-794 | Chemical Stability of Materials at Extreme Environment | 6 | Grad | | Fall 11 | 5 | 5 |
| 27-766 | Diffusion Solids | in 6 | Grad. | | Fall 11 | 4.61 | 4.67 |
| 27-216A | Transport Materials(b) | in 9 | Soph | | Spring 12 | 4.70 | 4.74 |

- (a) New course in the department
- (b) Course existed in the department but was newly designed by the candidate

8.B. Student Projects

(a) Undergraduate Projects

1. Michael Wood, Catalysts of fuel cells, 2000, co-advised with Prof. Kumta
2. Amy Fluharty, Liquid Cu wetting of Fe grain boundaries, 2000, co-advised with Prof. Cramb
3. Stacy Holden, Dissolution of inclusions in mold fluxes, 2000
4. Jonathan Bell, Inclusions at slag/steel interfaces, 2000, co-advised with Prof. Cramb
5. Karlos Benz, Mg₂Si precipitation on the surface of Al6020, 2001
6. Karlos Benz, A novel method for degassing of steels, 2001 (SURG)
7. James Chelmu, Mg₂Si precipitation on the surface of Al6061, 2001
8. Laurel Hoffman, Evolution of TRIP steel surfaces, 2002
9. Eric Schmidt, Austenite decomposition, 2004
10. Michael Nagle, Formation of pores during the GASAR-solidification process, 2004
11. Scott Roberts, Transformations in IF steels, 2005
12. David Soltesz, Transformations in IF steels, 2005
13. Abbie Bednar, Transformation in IF steels, 2005
14. Hanna-Soll Morris, TRIP steel oxidation, 2006
15. Clair Pubrick, TRIP steel oxidation, 2006

(b) Master's Students

1. Deepak Gupta, Viscosity estimation of melts in the carbothermic Al reduction process, 2002
2. Yan Wang, Inclusion evolution in steels, 2001
3. Neill McDonald, Peritectic reactions in Fe-based alloys, 2002
4. Chanjoon Paek, Peritectic reaction in Fe-C systems, 2003
5. Martin Kraus, Slag conditioning and splashing, visiting student from Royal Institute of Technology, 2002
6. Sofie Vantilt, Visualization of slag/metal interfaces, visiting student from Cath. Univ. of Leuven, 2002
7. Els Janssens, Foaming in stainless steel slags, visiting student from Cath. Univ. of Leuven, 2002
8. Tamara Baum, Simultaneous Decarburization and Oxide Scale formation on TRIP surfaces
9. Alistair Fox, Inclusion absorption in F-less mold fluxes, visiting student from Imperial College of Science, Technology and Medicine

(c) Ph.D. Students

1. Yan Wang, Inclusion evolution in steels, **Graduated 2004 January**
2. Neill McDonald, Peritectic reactions in Fe-based alloys, **Graduated 2004 December**
3. Martin Valdez, Inclusion optimization during casting, **Graduated 2006**, co-advised with Prof. Cramb
4. George Shannon, Inclusion separation across slag/steel interfaces, **Graduated 2007 September**
5. Casper Thorning, Oxide formation on TRIP steel surfaces, **Graduated 2008 June**
6. Eric Schmidt, Austenite formation and decomposition in duplex stainless steels, **Graduated 2007 November**
7. Bryan Webler, Cu hot shortness, **Graduated 2008 September**
8. Cong Wang, Transient reactions in the Ladle involving Al and Ti, **Graduated 2009 December**
9. Lan Yin, Occlusion mechanism of Cu in Fe-oxide scales, **Graduated 2011**
10. Jingxi Zhu, Effect of reactive elements on scaling of Fe-Cr alloys, **Graduated 2011**
11. Lam Helmick, Effect of crystallography on SOFC Performance, **Graduated 2011**
12. Tetsuya Kaneko, Refractory erosion in gasifiers, **Graduated 2011**
13. Jiwon Park, Processing of TRIP steels, **Graduated 2014**
14. June Bott, Subsurface AlN formation in AHS Steels for automotive applications, **Graduated 2014**
15. Erica Sampson, Effect of Si and furnace atmosphere on Cu-hot shortness, **Graduated 2014**
16. Andre Assis, P Control in BOF for low grade iron ore use, **Graduated 2014**
17. Mohammad Tayeb, P Control in EAF for low grade DRI use, current
18. Samuel Clark, Nano precipitation in AHSS, current
19. Katarina Hechu, Peritectic casting, current
20. Stephen Spooner, Slag/metal emulsion in the BOS, current
21. Tazdin Amietszajew, Recovery of rare metals from waste, **Graduated 2016**

8.C. Outreach

Professor Seetharaman was involved in the departmental project for Summer Academic Minority Institute (SAMS) in 2003. This involved developing a laboratory project for manufacturing and testing a solid Oxide Fuel Cell.

Professor Seetharaman was responsible for the Society of Women Engineering program for summer projects in MSE at high and middle school levels, 2005 and 2006.

I established the Vets4Stem program at CSM, and am currently working on developing it further with the Pat Tillman Center at ASU.

9. External Funding

Over the time of my career at CMU, CSM and ASU I have secured:

- NSF from DMR and CBET, approximately \$2.5 Million
- DOE from OIT, Fossil Fuel/NETL, EERE, LANL, LLNL and NREL approximately \$10 Million

- Steel industry, approximately \$7 Million
- PITA, approximately \$300,000

Over my career at Warwick, I have secured:

- EPSRC, approximately \$1,000 000
- HEFKE, approximately \$13,000000
- RGF, approximately \$1,000 000