RESUME

NIRUPAM CHAKRABORTI

Higher Academic Grade Professor

Department of Metallurgical & Materials Engineering

Adjunct Professor

Steel Technology Center

Indian Institute of Technology
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***Education*:** **Ph.D. University of Washington USA 1983**
Ph.C University of Washington USA 1982
M.S New Mexico Tech. USA 1979
B.Met.E Jadavpur University INDIA 1977

ALL DEGREES ARE IN METALLURGICAL AND MATERIALS ENGINEERING

Specialization **Materials Processing, Manufacturing and**

Iron and Steel with special emphasis on Mathematical Modeling using single and multi-objective Genetic and Evolutionary Algorithms.

International Affiliations **Former Adjunct Professor, Graduate Institute of Ferrous Technology (GIFT), Pohang University of Science & Technology (POSTECH), Korea**
Docent , Åbo Akademi University, Finland

Experience

2016: Visiting Reserchер, University of Jyväskylä Finland (Summer Term)

2018: Visiting Professor, AGH University, Krakow, Poland (Summer Term)

2017: Adjunct Professor, Colorado School of Mines, USA (Summer Term)

2016: Visiting Professor, University of Jyväskylä Finland (Summer Term)

2015: Visiting Research Professor, Åbo Akademi University, Finland

(Summer term)

2015: Visiting Expert, TATA Steel Europe, Netherlands

(Summer term)

2014: Visiting Research Professor, Åbo Akademi University, Finland

2013-14: Visiting Professor, Graduate Institute of Ferrous Technology (GIFT)

Pohang University of Science and Technology (POSTECH), Korea. Major

activity: Teaching/Research

2012-13: Visiting Professor, Florida International University, USA. Major activity: Teaching/Research

2000-present: Indian Institute of Technology, Kharagpur, Professor of Metallurgical & Materials Engineering, Currently, Higher Academic Grade Professor.

Major activity: Teaching/Research

August 2006- August 2009 Indian Institute of Technology, Kharagpur. Department Head of Metallurgical & Materials Engineering,

2008-present: Indian Institute of Technology, Kharagpur.
Adjunct Professor of Steel Technology Center
Major activity: Teaching/Research

1984-2000: Indian Institute of Technology, Kanpur.
(Promoted to full Professor of Materials & Metallurgical Engineering in 1995) Major activity: Teaching/Research.

International **2011: Visiting Professor, Åbo Akademi University and**

University of Jyväskylä Finland (Summer Term)

2010: Visiting Professor, Åbo Akademi University, Finland

Summer Term)

2009: Visiting Professor, Åbo Akademi University, Finland

(Summer Term)

Assignments **University of Jyväskylä, Finland, University of Southern California, USA**

Summer Leave from IIT, Kharagpur (May-July 2009)

2008*:* Visiting Professor Iowa State University, USA,

Åbo Akademi University, Finland

Summer Leave from IIT, Kharagpur (May-July 2008).

2007: Visiting Scientist, Ames Laboratory, Iowa, USA

Summer Leave from IIT, Kharagpur (Jun-July 2007).

2006: European Union Guest Docent at the Institute of

Computational Mathematics Johannes Kepler Univrsity, Austria.

Summer Leave from IIT, Kharagpur (May-July 2006).

2005: Visiting Professor, Åbo Akademi University, Finland. (Major Activity: Teaching/Research) Semester Leave from IIT, Kharagpur.

2003: Visiting Professor, Åbo Akademi University, Finland.

Summer Leave from IIT, Kharagpur.

2003: Visiting Professor, University of Jyväskylä Finland. Winter Leave from IIT, Kharagpur

2002: Visiting Expert, Materials Modifications. Inc. Fairfax, VA, USA. Summer Leave from IIT, Kharagpur.

2001: INSA -KOSEF Senior Exchange Visitor, Graduate Institute of Ferrous Technology, PosTech, Korea Summer Leave from IIT, Kharagpur.

1997, 1999 and 2000: CNPq (National Research Council of Brazil) Visiting Professor at UFOP, (Federal University of Ouro Perto, Brazil). Major Activity: A series of specialized lectures on Mathematical Modeling. Intensive Courses for Brazilian Steel Industry. Summer Leave from IIT, Kanpur

1995 and 1996: CSN and CNPq (National Steel Company and National Research Council of Brazil) Visiting Professor and International Expert at UFF (Fluminanse Federal University, Brazil). Major Activity: A series of specialized lectures on Mathematical Modeling. Summer Leave from IIT, Kanpur.

1994: International Expert invited by CSN (National Steel Company of Brazil). Major Activity: Initiation of a Post Graduate program on Mathematical Modeling in collaboration with CSN and UFF. Part of a 12 member team of international experts. Series of lectures on Mathematical Modeling. Short Leave from IIT, Kanpur.

1990-92: Visiting Assistant Professor, University of Utah, USA. Taught a total of seven Process Metallurgy courses, including Iron and Steelmaking. Participated in a number of research projects.

Represented the Department of Metallurgical Engineering during ABET accreditation. Served as a member of Ph. D comprehensive examination committee on pyrometallurgy. Long Leave from IIT, Kanpur.

1988-89: Max-Planck Institute, Germany. Invited Scientist. Conducted phase diagram research. Short Leave from IIT, Kanpur.

1996-97: Visiting Professor of Chemical Engineering Birla Institute of Technology, Pilani

1979-83: University of Washington, USA. Graduate Research/Teaching Assistant, Washington State Mining and Mineral Institute Research Fellow.

1977-79: New Mexico Tech., USA. Graduate Research Assistant.

Major International Recognitions

A special symposium entitled *"Evolutionary Algorithms and Artificial Intelligence in Metallurgy and Materials Science - in Honour of Professor Nirupam Chakraborti"* was heled in the XXVI th conference on Computer Methods in Materials Technology (KomPlasTech), at Zakopane, Poland in January 2019. KomPlasTech conference is being organized for over quarter of a century and is the longest running academic conference in this area.

BioGP (Bi-objective Genetic Programming) algorithm incorporated in Kimeme professional software of Cyber Dyne s.r.l. Italy.

Python versions Data-driven modeling algorithms EvoNN (Evolutionary Neural Net), EvoDN2 (Evolutionary Deep Neural Net) and BioGP (Bi-objective Genetic Programming) are being available in the public domain through a project funded by the Academy of Finland.

Professional Recognitions

Adjunct Professor of Pohang University of Science & Technology (POSTECH), Korea.

Docent of Soft Computing in Materials Science & Technology, Åbo Akademi University, Finland

Outstanding Reviewer Award winner for 2018, Bioinspiration & Biomimetics (IOP Publishing)

International Association of Advanced Materials (IAAM) Scientist Medal, 2017

Member of the Editorial Board: Materials & Manufacturing Processes (Taylor & Francis)

Memebr of the International Editorial Board: Computer Methods in Materials Science, Poland

Member of the Editorial Board: The Scientific World Journal (Hindwai)

Member of the Editorial Board: International Journal of Machining and Machinability of Materials (Inderscience)

Member of the Editorial Board: Journal of Advanced Research in Evolutionary Algorithms (Institute of Advanced Scientific Research)

Guest Editor: So far edited a total of ten special issues of Materials & Manufacturing Processes (Taylor & Francis) including five devoted exclusively to Genetic Algorithms.

Guest Editor: International Journal of Mechatronics and Manufacturing Systems (IJMMS), Special Issue on "Optimization Techniques in the Manufacturing Processes, 2009"

Member of the Editorial Board, Handbook of Research on Nature Inspired Computing for Economy and Management, Idea Group, Inc., 2006

Top Reviewer Award: Applied Soft Computing (Elsevier BV) 2010

Reviewer of numerous International Journals (List Available on request)

Listed in Marquis Who is Who.

Doctoral thesis examiner: Åbo Akademi University, Finland.

Plenary Speaker: KomPlasTech 2013, Zakopane, Poland 2013

Williams Lecture: Colorado School of Mines, USA, 2013

Minta Martin Lecture: University of Maryland, USA, 2013

Intensive Course

Intensive Course on Single and Multi-objective Genetic Algorithms University of Jyväskylä, Finland (2011)

Intensive Course on Single and Multi-objective Genetic Algorithms, Università degli Studi di Milano, Italy (2009)

Intensive Course on Single and Multi-objective Genetic Algorithms, University of Jyväskylä, Finland (2009)

Intensive Course on Genetic Algorithms, Lappeenranta University of Technology, Finland (International Summer School on Novel Computing August 2004)

Intensive Course on Genetic Algorithms, Åbo Akademi University, Finland (2003)

Intensive Course on Genetic Algorithms, University of Jyväskylä Finland (2003)

Coordination and lectures in Workshop of Genetic Algorithm and Artificial Intelligence in Steel making, National Steel Company (CSN) and Fluminense Federal University (UFF-EEIMVR), Volta Redonda, R.J., Brazil (1996)

Series of courses conducted for the Brazilian Steel Industry at Federal University of Ouro Preto (UFOP), Brazil: Intensive Course on Mathematical Modeling in Iron and Steelmaking (1997), Coal Injection in Blast Furnace (1999), Genetic Algorithms in Ferrous Production Metallurgy (2000)

Invited Lectures:

FOM Institute of Atomic & Molecular Physics, Amsterdam (1989)

Technical University of Eindhoven, Netherlands (1989)

University of Washington, USA (1993)

University of Utah, USA (1993)

Federal University of Ouro Preto, Brazil (1994)

RWTH, Aachen, Germany (1998)

Max-Planck Institute, Stuttgart, Germany (1998)

Pohang Steel Company, Korea (2001)

Seoul National University, Korea (2001)

University of Jyväskylä Finland (2003)

Lappeenranta University of Technology, Finland (2003)

MEFOS, Sweden (2005)

Outukumpu Oy, Stainless Steel Division, Finland (2005)

Helsinki School of Economics, Finland (2005)

Lund University, Sweden (2005)

AGH, Krakow, Poland (2011)

Pusan National University, Korea (2014)

Several Indian Organizations like Tata Institute of Fundamental Research, Indian Institute of Technology, Kharagpur, Bhaba Atomic Research Center, Regional Research Laboratory, Bhubaneshwar, Institute of Engineers, Calcutta chapter, Jadavpur University

Conference Presentation: **Several including TMS-Dallas, SME-Phoenix, CALPHAD-Madison, EUFIT-Aachen, EUROGEN-Barcelona, IPDO 2007 Miami (Keynote Lecture) E-MRS 2007 Warsaw, Invited and Tutorial Lectures. Materials Informatics & DFT, Oran, Algeria 2008 (Keynote Lecture), KomPlasTech 2010, Zakopane, Poland (Keynote Lecture) TMS -2012 (Orlando) etc.**

Recommendation: **Available on request.**

Publications: **List Attached.**

SELECTED PUBLICATIONS

Edited Book

Simulated Evolution and Learning, Springer-Verlag, Berlin, 2010

Book Chapters:

Contributory Chapter**: Evolutionary Computation in Blast Furnace Iron Making. in Optimization in Industry (pp. 211-252). Springer, Cham. 2019 (with Mahanta, B. K.)**

Contributory Chapter: **Evolutionary algorithms in ironmaking applications, Apple Academic Press, 2016 (with T. Mitra and H. Saxén)**

Contributory Chapter: **Data-driven Bi-objective Genetic Algorithms EvoNN and BioGP and their applications in metallurgical and materials domain., Computational Approaches to Materials Design: Theoretical and Practical Aspect. IGI-Global, 2016, Single Authored**

Contributory Chapter: **Strategies for Evolutionary Data-Driven Modeling in Chemical and Metallurgical Systems, Applications of Metaheuristics in Process Engineering, Springer 2014, Single Authored**

Contributory Chapter: **Evolutionary Data-Driven Modeling, Informatics for Materials Science and Engineering, Elsevier 2013, Single Authored**

Contributory Chapter: **Pareto-optimality in Design and Manufacturing and How Genetic Algorithms handle it. Handbook of Research on Nature Inspired Computing for Economy and Management, Idea Group, Inc., 2006 , Single Authored**

Contributory Chapter **Genetic Algorithms and Related Techniques for Optimizing Si-H Clusters: A merit Analysis for Differential Evolution. Differential Evolution A Practical Approach to Global Optimization, Springer Natural Computing Series (2005), Single Authored**

Research Articles:

Atomistic Simulation and Evolutionary Optimization of Fe-Cr Nanoparticles, Materials and Manufacturing Processes (2019), Accepted (With Shubham Singhal Apurva Sijaria, Venkatesh Pai, Amlan Dutta)

Tri-objective optimization of noisy dataset in blast furnace iron-making process using evolutionary algorithms. Materials and Manufacturing Processes (2019) DOI: 10.1080/10426914.2019.1643472 (with Bashista Kumar Mahanta)

Interfacial energy of copper clusters in Fe-Si-B-Nb-Cu alloys, Scripta Materialia 162 (2019) pp. 331-334. (With Rajesh Jha, David Diercks, Aaron Stebner, Cristian V. Ciobanu)

Evolutionary Data driven modeling and multi objective optimization of noisy data set in blast furnace iron making process, Steel Research International, 2018, 89, 1800121 DOI: 10.1002/srin.201800121 (With Bashista Kumar Mahanta)

Combined machine learning and CALPHAD approach for discovering processing-structure relationships in soft magnetic alloys Computational Materials Science, 150 (2018) pp. 202-211 (With Rajesh Jha, David R. Diercks, Aaron P. Stebner, Cristian V. Ciobanu)

Self-Organizing Maps for Pattern Recognition in Design of Alloys. Materials and Manufacturing Processes, 32 (2017) pp. 1067-1074 (with Jha, R., Dulikravich, G.S., Fan, M., Schwartz, J., Koch, C.C., Colaco, M.J., Poloni, C. and Egorov, I.N.)

A data-driven surrogate-assisted evolutionary algorithm applied to a many-objective blast furnace optimization problem. Materials and Manufacturing Processes, 32 (2017) pp. 1172-1178 (With Tinkle Chugh, Karthik Sindhya and Yaochu Jin)

Optimization of Annealing Cycle Parameters of Dual Phase and Interstitial Free Steels by Multiobjective Genetic Algorithms, Materials and Manufacturing Processes, 32 (2017) pp. 1201-1208 (With Md. Karimulla Shah, Rishav Kumar, Sibasis Sahoo, R. S. Pais, Debalay Chakrabarti)

Blast Furnace Charging Optimization using Multi-Objective Evolutionary and Genetic

Algorithms. Materials and Manufacturing Processes, 32 (2017) pp. 1179-1188 (with Mitra, T., Pettersson, F., Saxén, H.).

Effect of Carbon Distribution During the Microstructure Evolution of Dual-Phase Steels Studied Using Cellular Automata, Genetic Algorithms, and Experimental Strategies, Metallurgical and Materials Transactions A, 2 47.12 (2016): pp. 5890-5906., (With Chandan Halder, Anish Karmakar, Sk.Md. Hasan, Debalay Chakrabarti, Maciej Pietrzyk)

Algorithms for design optimization of chemistry of hard magnetic alloys using experimental data. Journal of Alloys and Compounds, (2016) 682, pp.454-467 (With Jha, R., Dulikravich, G.S., , Fan, M., Schwartz, J., Koch, C.C., Colaco, M.J., Poloni, C. and Egorov, I.N.).

Optimised recrystallisation model using multiobjective evolutionary and genetic algorithms and k -optimality approach, Mater. Sci. Technol. (2016)32, pp. 366-374. (With C. Halder, M. Sitko, L. Madej, M. Pietrzyk)

Simulation and meta-modeling of electron beam welding using genetic algorithms, Metallurgia Italiana. Issue 3, 2016, p.45. (With Kaibalya Mohanty, Gour Gopal Roy)

Multiple Criteria in a Top Gas Recycling Blast Furnace Optimized through a k-Optimality-Based Genetic Algorithm. Steel Research Int., (2016), 87, pp. 1284-1294 (with Mohanty, K., Mitra, T., Saxén, H.)

Evolutionary Design of Nickel-Based Superalloys Using Data-Driven Genetic Algorithms and Related Strategies, Materials and Manufacturing Processes, Volume 30, Issue 4, 2015; p. 488 (With R. Jha, F. Pettersson, G. S. Dulikravich, H. Saxén)

Determination of anisotropic yield coefficients by a robust multi-objective evolutionary algorithm, Materials and manufacturing Processes, Volume 30, Issue 4, 2015, p. 403 (with K. Hariharan, Nguyen Ngoc-Trung, M-G. Lee and F. Barlat)

Optimization of Cellular Automata Model for the Heating of Dual Phase Steel by Genetic Algorithm and Genetic Programming, Materials and manufacturing Processes, Volume 30, Issue 4, 2015, p. 552 (With Chandan Halder, Lukasz Madej, Maciej Pietrzyk)

Sensitivity analysis of the finite difference 2-D cellular automata model for phase transformation during heating, ISIJ International, 55, 2015, p. 285 (With Chandan Halder, Daniel Bachniak, Lukasz Madej, Maciej Pietrzyk)

Multi-Objective Genetic Algorithm to Optimize Variable Drawbead Geometry for Tailor Welded Blanks Made of Dissimilar Steels, Steel Research International, 85, 2014, p. 1597 (with K. Hariharan, Nguyen Ngoc-Trung, M-G. Lee and F. Barlat)

Critical Assessment: The unique contributions of multi-objective evolutionary and genetic algorithms in materials research, Materials Science and Technology, 2014, 30, p. 1259

A Novel Multi-objective Genetic Algorithms Based Calculation of Hill's Coefficients, Metallurgical and Materials Transactions A, 2014, 45, p. 2704 (with K. Hariharan, M-G. Lee and F. Barlat)

Multi-objective genetic algorithms and genetic programming models for minimizing input carbon rates in a blast furnace compared with a conventional analytic approach, Steel Research International, 2014, 85, p. 219 (with R. Jha and P.K. Sen)

Promise of multiobjective genetic algorithms in coating performance formulation. Surface Engineering, 2014, 30, p.79

Genetic Programming Evolved through Bi-Objective Genetic Algorithms Applied to a Blast Furnace, Materials and Manufacturing Processes, 2013, 28, p. 776. (with B. K. Giri. F. Pettersson, H. Saxén)

Genetic Programming through Bi-objective Genetic Algorithms with Study of a Simulated Moving Bed Process involving Multiple Objectives, Applied Soft Computing 2013, 13, p. 2613 (with B. K. Giri., J. Hakanen, K. Miettinen)

Pareto-optimal Analysis of Zn-coated Fe in the Presence of Dislocations Using Genetic Algorithms, Computational Materials Science, 2012, 62, p. 266 (with P. Rajak, , S. Ghosh, B. Bhattacharya)

Optimization of stability of retained austenite in TRIP aided steel using Data-driven models and Multi-objective Genetic Algorithms, 2012, J. ASTM Int. (Materials Performance and Characterization), 1, (with A. Ghosh and S.B. Singh)

Data-driven Pareto Optimization for Microalloyed steels using Genetic Algorithms Steel Research International, 2012, 83, p.169 (with A. Kumar and D. Chakrabarti)

Phases in the Zn-coated Fe Analyzed through an Evolutionary Meta-model and Multi-objective Genetic Algorithms, Computational Materials Science, 2011, 50, p. 2502 (with P. Rajak, U. Tewary, S. Das, B. Bhattacharya)

Cu-Zn Separation by Supported Liquid Membrane Analyzed through Multi-objective Genetic Algorithms, Hydrometallurgy, 2011, 107, p. 112 (with D. N. Mondal, K. Sarangi, F. Pettersson, P. K. Sen, H. Saxén)

Data Driven Multi-objective Analysis of Manganese Leaching from Low Grade Sources Using Genetic Algorithms, Genetic Programming and Other Allied Strategies algorithms Materials and Manufacturing Processes, 2011, 26, p. 415 (with A. Biswas, O. Maitre , D. N. Mondal , S. K. Das, P. K. Sen, P. Collet)

Multi-objective optimization of top gas recycling conditions in the blast furnace by genetic algorithms, Materials and Manufacturing Processes, 2011, 26, p. 475 (with T. Mitra, M. Helle, F. Pettersson, H. Saxén)

Analysing blast furnace data using evolutionary neural network and multiobjective genetic algorithms, Ironmaking and Steelmaking, 2010, 37, p. 353 (with A. Agarwal, U. Tewary, F. Pettersson, S. Das, H. Saxén)

Analyzing the fluid flow in continuous casting through evolutionary neural nets and multi-objective genetic algorithms, Steel Research International, 2010, 80, p. 197 (with D. Govindan, S. Chakraborty)

Analyzing Fe-Zn system Using Molecular Dynamics, Evolutionary Neural Nets and Multi-objective Genetic Algorithms, Computational Materials Science, 2009, 46, pp.821-827 (With B. Bhattacharya, G.R. Dinesh Kumar, A. Agarwal, Ş Erkoç, A. Singh)

How multi-objective genetic algorithms handle lack of data, sparse data and excess data: evaluation of some recent case studies in the materials domain, Statistical Analysis and Data Mining, 2009, 1(5) , Pages 322- 328 DOI: 10.1002/sam.10025

A Genetic Algorithms Based Multi-objective Optimization Approach Applied to a Hydrometallurgical Circuit for Ocean Nodules, Mineral Processing and Extractive Metallurgy Review, 2009, 30, p. 163 (With A. Biswas and P.K. Sen)

Multi-Objective Materials Design by Genetic Algorithms—Generalized for B1 and B2 Ionic Structures, Journal of Computational and Theoretical Nanoscience, 2009, 6, p. 849 (with R. Sreevathsan, B. Bhattacharya and G. Dinesh Kumar)

Tailor-made material design: An evolutionary approach using multi-objective genetic algorithms, Computational Materials Science, 2009, 45, p. 1 (with R. Sreevathsan, R. Jayakanth, B. Bhattacharya)

Genetic algorithms based multi-objective optimization of an iron making rotary kiln, Computational Materials Science, 2009, 45, p. 181 (with D Mohanty and A Chandra)

Genetic algorithm-based search on the role of variables in the work hardening process of multiphase steels, Computational Materials Science, 2009, 45, p. 158 (with S. Ganguly and S. Datta)

Modeling of recrystallization in cold rolled copper using inverse cellular automata and genetic algorithms, Computational Materials Science, 2009, 45, p. 96. (with S Ghosh, P Gabane and A Bose)

Analyzing Leaching Data for Low-Grade Manganese Ore Using Neural Nets and Multiobjective Genetic Algorithms, Materials and Manufacturing Processes, 2009, 24, p. 320 (with F. Pettersson, A. Biswas, P.K Sen, H. Saxén,)

Identification and Optimization of AB_2 Phases Using Principal Component Analysis, Evolutionary Neural Nets, and Multiobjective Genetic Algorithms, Materials and Manufacturing Processes, 2009, 24, p. 274 (with A. Agarwal, F. Pettersson, A. Singh, C. S. Kong, H. Saxén, K. Rajan, S. Iwata)

Analyzing Sparse Data for Nitride Spinels Using Data Mining, Neural Networks, and Multiobjective Genetic Algorithms, Materials and Manufacturing Processes, 2009, 24, p. 2 (with F. Pettersson, C Suh , H Saxén and K. Rajan)

Multiobjective Optimization of Manganese Recovery from Sea Nodules Using Genetic Algorithms Materials and Manufacturing Processes, 2009, 24, p. 22 (with A. Biswas and P.K. Sen)

Designing the Multiphase Microstructure of Steel for Optimal TRIP Effect: A Multiobjective Genetic Algorithm Based Approach, Materials and Manufacturing Processes, 2009, 24, p. 31 (with S. Ganguly, S. Datta and P. P. Chattopadhyay)

Real-world applications of multiobjective optimization, 2008, Lecture Notes in Computer Science 5252 LNCS, p. 285 (with Stewart, T., Bandte, O., Braun, H., , Ehrgott, M., Göbelt, M., Jin, Y., Nakayama, H, Poles, S, Di Stefano, D)

Fluid flow in hydrocyclones optimized through multi-objective genetic algorithms, Inverse Problems in Science and Engineering, 2008, 16, p. 1023(with A. Shekhar, A. Singhal, S. Chakraborty , S. Chowdhury, R. Sripriya.)

A new multi-objective genetic algorithm applied to hot-rolling process, Applied Mathematical modelling 2008, 32 p. 1781 (with BS Kumar, VS,Babu, S Moitra, A. Mukhopadhyay)

Extraction of Factors Governing Mechanical Properties of TRIP-Aided Steel by Genetic Algorithms and Neural Networks, Materials and Manufacturing Processes, 2008, 23, p. 130 (with S. Datta, F. Pettersson, S. Ganguly and H. Saxén)

Optimization of non ferrous metals recovery from sea nodules in a hydrometallurgical circuit using multi-objective evolutionary and genetic algorithms Hydrometallurgy 2008: Proceedings of the 6th International Symposium, pp. 298-314 (with A. Biswas and P.K. Sen)

Neural networks analysis of steel plate processing augmented by multi-objective genetic algorithms, Steel Research International, 2007, 78 p. 884 (with F. Pettersson and S.B. Singh)

Designing high strength multi-phase steel for improved strength-ductility balance using Neural Networks and Multi-objective Genetic Algorithms, ISIJ International , 2007, 47 p. 1195 (with S. Datta, F. Pettersson, S. Ganguly and H. Saxén)

Fluid Flow in a Tundish Optimized through Genetic Algorithms, Steel Research International, 2007, 78, p. 517 (with A. Kumar, S. Chakraborty)

A novel method for alignment of two nucleic acid sequences using ant colony optimization and genetic algorithms, Applied Soft Computing , 2007, 7, p. 1121 (with S.R. Jangam)

Genetic Algorithms applied to Li+ ions contained in carbon nanotubes: An investigation using Particle Swarm Optimization and Differential Evolution along with Molecular Dynamics, Materials and Manufacturing Processes 2007, 22, p. 562 (with S. Das, R. Jayakant, R. Pekoz, and Ş. Erkoç)

Genetic Algorithms in optimization of strength and ductility of low carbon steels, Materials and Manufacturing Processes 2007, 22, p. 650 (with S. Ganguly and S. Datta)

Evolutionary and Genetic Algorithms Applied to Li^{+}-C System: Calculations Using Differential Evolution and Particle Swarm Algorithm, Journal of Phase Equilibria and Diffusion, 2007, 28, p. 140 (with R. Jayakanth, S. Das, E.D. Çalişir, and Ş. Erkoç)

Solving the molecular sequence alignment problem with generalized Differential Evolution

3 (GDE3), Proceedings of the 2007 IEEE Symposium on Computational Intelligence in Multicriteria Decision Making, MCDM 2007, art. no. 4223020, pp. 302-309 (S. Kukkonen and S.R. Jangam)

Evolutionary and Genetic Algorithms Applied to Hot Rolling: A Multi-objective Rolling Schedule Studied Using Particle Swarm Algorithm, Transactions of Indian Institute of Metals, 2006, 59, p. 681(with S. Moitra, A. Mitra and A. Mukhopadhyay)

Re-evaluation of the Optimal Operating Conditions for the Primary End of an Integrated Steel Plant using Multi-objective Genetic Algorithms and Nash Equilibrium, Steel Research International, 2006, 77, p. 459 (With B.M. Hodge and F. Pettersson)

Optimizing Surface Profiles during Hot Rolling: A Genetic Algorithms Based Multi-objective Optimization Computational Materials Science, 2006, 37, p. 159 (with B. Siva Kuamr, V. Satish Babu, S. Moitra, and A. Mukhopadhyay).

Multi-objective Optimization of a Two-Dimensional Cutting Problem Using Genetic Algorithms, Journal of Materials Processing Technology, 2006, 173, p. 384 (with S. Tiwari).

A Genetic Algorithms Based Multiobjective Neural Net Applied to Noisy Blast Furnace Data, Applied Soft Computing, 2007, 7, p.387(with F. Pettersson and H. Saxén).

Modeling Noisy Blast Furnace Data using Genetic Algorithms and Neural Networks, Steel Research International, 2006, 77, p. 75 (with M. Helle, F. Pettersson and H. Saxén).

Genetic algorithms in these changing steel times, Ironmaking & Steelmaking, 2005, 32 p. 401

Modeling the Recrystallization Process Using Inverse Cellular Automata and Genetic Algorithms: Studies Using Differential Evolution 2005, Journal of Phase Equilibria and Diffusion, 26, 2005 p. 311 (with T.D. Rane, S. Ghosh and K. Mitra).

A Genetic Algorithms-Based Multi-objective Approach for a Three-Dimensional Guillotine Cutting Problem, Materials and Manufacturing Processes, 2005, 20, p.697 (with Y. Vidyakiran and B. Mahanty).

The Williams and Otto Chemical Plant Re-evaluated Using a Pareto Optimal Formulation Aided By Genetic Algorithms, Applied Soft Computing, 2006, 6: p. 189 (with P. Mishra, A. Aggarwal, A. Banerjee and S.S. Mukherjee)

Simulating Recrystallization through Cellular Automata and Genetic Algorithms, Modelling and Simulation in Materials Science and Engineering, 2005, 13: p. 173 (with R. Dewri)

Regulating Crown and Flatness During Hot Rolling: A Multi-objective Optimization Study Using Genetic Algorithms, Materials and Manufacturing Processes, 2005, 20, p. 459 (with R. Nandan, R. Rai, R. Jayakanth,S. Moitra, and A. Mukhopadhyay)

Gas Injection in Steelmaking Vessels: Coupling a Fluid Dynamic Analysis with a Genetic Algorithms Based Pareto-optimality, Materials and Manufacturing Processes, 2005, 20, p. 363. (with A Kumar, D. Sahoo, and S Chakraborty)

A Study of the Cu Clusters Using Gray-coded Genetic Algorithms and Differential Evolution, 2004, Journal of Phase Equilibria and Diffusion, 2004, 25, p. 16 (with P. Mishra

and Ş. Erkoç)

Pb-S-O Vapor System Re-evaluated Using Genetic Algorithms , Journal of Phase Equilibria and Diffusion, 2004, 25, p. 421 (with Jha PK)

Genetic Algorithms in Materials Design and Processing, Commissioned Article for International Materials Reviews, 2004, 49, p. 246.

Optimization of Aluminum Oxynitride (ALON) Compaction Process Using A Gray Coded Genetic Algorithm, Materials Letters, 2003, p136 (with P. Mishra and A Banerjee)

Re-evaluation of Some Select Si_nH_{2m} Clusters Using Genetic Algorithms, Journal of Phase Equilibria, 2003, 24, p. 132 (with R. Kumar).

Optimization of Continuous Casting Process Using Genetic Algorithms: Studies of the Spray and Radiation Cooling Regions, Ironmaking Steelmaking, 2003, 30, p. 273. (with RSP Gupta and TK Tiwari)

The Optimal Scheduling of a Reversing Strip Mill: Studies Using Multi-population Genetic Algorithms and Differential Evolution, Materials and Manufacturing Processes, 2003, 18 , p. 433 (with A. Kumar)

Application of Genetic Algorithms to Hydrogenated Silicon Clusters, Bulletin of Materials Science, 2003, 26, p. 127. (with R. Prasad)

A Heat Transfer Study of the Continuous Caster Mold Using a Finite Volume Approach Coupled with Genetic Algorithms Journal of Materials Engineering and Performace , 2003, 12, p. 430 (with G.G. Roy and S. Kumar)

Genetic Algorithms in Ferrous Production Metallurgy, *Invited article* Surveys on Mathematics for Industry. Springer-Verlag. 2002. 10, p.269.

Genetic Algorithms Based Structure Calculations for Hydrogenated Silicon Clusters, Materials Letters, 2002, 55 (1-2), p. 20 (with P.S. De and R. Prasad)

Steel for a Billion People: A Brief Appraisal of Indian Steel Research, *Invited article*, Steel Research, 2001, vol 72(3), p. 73.

A Study of the Continuous Casting Mold Using a Pareto-converging Genetic Algorithm, Applied Mathematical Modelling, 2001, vol 25(4), p. 287 (with R. Kumar and D. Jain)

Tight-binding Calculations of Si-H Clusters Using Genetic Algorithms and Related Techniques: Studies Using Differential Evolution, Journal of Phase Equilibria, 2001, vol. 22, p 525 (with K. Mishra, P. Bhatt, N. Barman and R. Prasad)

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