

Rohan Chakrabarty

3610 University Street, M.H. Wong Building, Rm 2460, Montreal, QC, Canada H3A 0C5
(+1) (514)-586-9114 | rohan.chakrabarty@mail.mcgill.ca | www.rohanrc.com

Education

McGill University, Canada

2014 - Present

- **Doctor of Philosophy**, Department of Mining and Materials Engineering
Advisor: Jun Song
Dissertation: *Numerical modeling of composite coating in cold gas dynamic spray process*

Indian Institute of Technology Bombay, India

2011 - 2013

- **Master of Technology (MTech)**, Dept. of Metallurgical Engineering and Materials Science
Advisors: Indradev Samajdar, P.J Guruprasad
Dissertation: *Study of deformation microstructures in electrical steel.*

Maharaja Sayajirao University of Baroda, India

2007 - 2011

- **Bachelor of Engineering**, Department of Metallurgical and Materials engineering
Advisor: M.N Patel
Dissertation: *Study the effects of heat treatment and electro-discharge machining on tool steel.*

Research Interests

- Modeling of deformation of metals and ceramics at high strain rates.
- Coldspray additive manufacturing process.
- Failure modeling in brittle materials.
- Multiscale modeling of plasticity and fracture in metals.
- Application of machine learning and data science in materials science.

Research Skills

Computational: Experienced in nonlinear Finite Element Analysis (FEA) using ABAQUS and in development and implementation of material models in ABAQUS using FORTRAN subroutines; Proficient in Python scripting and MATLAB programming to develop realistic complex part geometries; Has a theoretical understanding of data analysis and machine learning for predictive modeling and solving classification problems.

Experimental: Proficient in metallurgical polishing; Experienced in materials-characterization methods: Scanning Electron Microscopy, Electron Backscatter Diffraction (EBSD).

Research Experience

Doctor of Philosophy in Materials Engineering, McGill University, Canada

2014 - Present

- Modeling of deformation of metallic and ceramic materials at high strain rates experienced during Coldspray additive manufacturing process.
- Predicted the coating deposition behavior using smoothed particle hydrodynamics and nonlinear finite element analysis in ABAQUS software.
- Developed a modified Johnson Cook material model for Coldspray process. Implemented the constitutive model in Abaqus using FORTRAN subroutine.
- Python scripting and MATLAB programming to develop realistic complex part geometries for better understanding and prediction of the additive manufacturing process.
- Outlined methodologies to improve the coating properties and ceramic retention in the particle reinforced metal matrix composites.

Master of Technology in Materials Science, IIT Bombay

2011 - 2013

- Studied the effect of stresses and strain paths on the various properties of the Grain-Oriented Electrical (CRGO) Steel and Non-Grain-Oriented Electrical Steel.
- Developed a MATLAB program to quantify geometrically necessary dislocation density (GND) for CRGO by utilizing orientation data obtained from EBSD scans.
- Studied the experimentally observed phenomenon using 2D dislocation dynamics simulations.

Bachelor of Engineering in Metallurgical and Materials engineering, MSU Baroda

2007 - 2011

- Studied the effects of heat treatment and electro-discharge machining on hot work tool steel using microstructural and failure analysis of the heat treated and failed H-13 samples.
- Suggested remedial measures for prevention of failures of the extrusion dies after EDM – an actual industrial problem.

Industrial Experience

Ashapura Minechem Limited, India

July 2013 – October 2013

Research and development officer

- Spearheaded new product development: Developed and optimized process route for surface modified calcined kaolin, low alkali content kaolin and Nano-clay product for various applications.

Honors & Awards

Horace G. Young Fellowship for excellence in research, McGill University, Canada	2018
Metallurgy and Materials Society of CIM Travel Grant, Canada	2018
Graduate Research Enhancement and Travel Award, McGill University, Canada	2017
Graduate Research Enhancement and Travel Award, McGill University, Canada	2016
McGill Engineering Doctoral Award (MEDA), McGill University, Canada	2014-2017
Ministry of Human Resource Development scholarship, Govt. of India, India	2011-2013

Journal Publications

Published:

1. **Chakrabarty, R.**, & Song, J. (2017). Effect of impact angle on ceramic deposition behavior in composite cold spray: A finite-element study. *Journal of Thermal Spray Technology*, 26(7), 1434-1444.
2. Chu, X., **Chakrabarty, R.**, Che, H., Shang, L., Vo, P., Song, J., & Yue, S. (2018). Investigation of the feedstock deposition behavior in a cold sprayed 316L/Fe composite coating. *Surface and Coatings Technology*, 337, 53-62.
3. Chu, X., Che, H., Vo, P., **Chakrabarty, R.**, Sun, B., Song, J., & Yue, S. (2017). Understanding the cold spray deposition efficiencies of 316L/Fe mixed powders by performing splat tests onto as-polished coatings. *Surface and Coatings Technology*, 324, 353-360.
4. Shekhawat, S. K., **Chakrabarty, R.**, Basavaraj, V., Hiwarkar, V. D., Mani, K. V., Guruprasad, P. J., ... & Samajdar, I. (2015). Orientation-dependent plastic deformation in transformer steel: Experiments and dislocation dynamics simulations. *Acta Materialia*, 84, 256-264.
5. Shekhawat, S. K., Basavaraj, V., Hiwarkar, V. D., **Chakrabarty, R.**, Nemade, J., Guruprasad, P. J., ... & Samajdar, I. (2014). Direct Experimental Observations on Concurrent Microstructure and Magnetic Property Developments in Non-Grain Oriented Electrical Steel. *Metallurgical and Materials Transactions A*, 45(9), 3695-3698.

In preparation:

1. **Chakrabarty, R.**, & Song, J. New Insights to the Bonding Mechanisms in Metal-Ceramic Composite Cold Spray.
2. **Chakrabarty, R.**, & Song, J. Use of Modified Johnson-Cook Model in Simulation of Metal-ceramic Composite Cold Spraying
3. **Chakrabarty, R.**, & Song, J. Numerical investigation of rebounding and deposition behaviors of ceramic particles during metal-ceramic composite cold spraying.
4. Munagala, V.N.V., **Chakrabarty, R.**, Song, J., & Chromik. R. The Effect of Metal Powder Properties on the Cold Spray of Ti Metal-matrix Composite

Conference Presentations/ Contributed Talks

Presenter underlined

1. V.N.V. Munagala, **R. Chakrabarty**, J. Song, R. Chromik, The Effect of Metal Powder Properties on the Cold Spray of Ti Metal-matrix Composite, Materials Science and Technology 2018 (14-18 October 2018 in Columbus, OH, USA).
2. **R. Chakrabarty**, J. Song, Use of Modified Johnson-Cook Model in Simulation of Metal-ceramic Composite Cold Spraying, 13th World Congress in Computational Mechanics (22-27 July 2018 in New York city, NY, USA).
3. **R. Chakrabarty**, J. Song, Use of Modified Johnson-Cook Model in Simulation of Metal-ceramic Composite Cold Spraying, 30th Canadian Materials Science Conference (19-22 June 2018 in Edmonton, AB, Canada).
4. **R. Chakrabarty**, J. Song, Determination of Ceramic Retention in Composite Cold Spray: A Finite-element Study, Materials Science and Technology 2017 (8-12 October 2017 in Pittsburgh, PA, USA).
5. **R. Chakrabarty**, J. Song, New Insights to the Bonding Mechanisms in Metal-Ceramic Composite Cold Spray, Materials Science and Technology 2017 (8-12 October 2017 in Pittsburgh, PA, USA).
6. **R. Chakrabarty**, J. Song, Effect of impact angle on ceramic deposition behavior in composite cold spray: A finite-element study, Materials Science and Technology 2017 (8-12 October 2017 in Pittsburgh, PA, USA).
7. **R. Chakrabarty**, J. Song, Effect of impact angle on ceramic deposition behavior in composite cold spray: A finite-element study, 54th Annual Technical Meeting of the Society of Engineering Science (SES) (25-28 July 2017 in Boston, MA, USA).
8. **R. Chakrabarty**, J. Song, New Insights to the Bonding Mechanisms in Metal-Ceramic Composite Cold Spray, 54th Annual Technical Meeting of the Society of Engineering Science (SES) (25-28 July 2017 in Boston, MA, USA).

Teaching Experience

McGill University, Canada

Teaching Assistant

- Structure of materials (MIME 261), Fall 2017, Fall 2018
- Materials Science and Engineering (MIME 260), Fall 2018

McGill University, Canada

Grader

- Phase transformations (MIME 360), Fall 2017
- Materials Science and Engineering (MIME 260), Fall 2016

Indian Institute of Technology Bombay, India

Teaching Assistant

- Mechanical Working of Metals (MM 302), Spring 2013
- Electron Microscopy and X-Ray diffraction (MM 684), Fall 2012
- Advanced physical and mechanical metallurgy (MM 621), Spring 2012

Professional Affiliations and Activities

Member: The American Ceramic Society (ACerS), Association for Iron & Steel Technology (AIST), ASM International, The Minerals, Metals and Materials Society (TMS).

Reviewer: Applied surface science

Volunteering Activities

- **Post-Graduate Student's Society, McGill University, Canada** *2017-2018*
Student committee member, Policy and Structure Advisory Committee
- **Faculty of Engineering, McGill University, Canada** *2018*
Mentor: Summer Undergraduate Research in Engineering (SURE) Research Poster session
- **Faculty of Engineering, McGill University, Canada** *2016-2017*
Judge: Summer Undergraduate Research in Engineering (SURE) Research Poster session
- **International Student Services, McGill University, Canada** *July 2015*
International Student Buddy Program Volunteer
- **Institute Student Companion Program, IIT Bombay, India** *July 2012*
International Student Buddy Program Volunteer