

Richard Andrew Couperthwaite

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Personal Profile

- I am currently a Ph.D. student in the Materials Science & Engineering Department at Texas A&M University. The main focus of my research work is the use of computational methods, particularly thermodynamic and kinetic modeling of microstructure, in the design method. I am comfortable coding in both Python and Matlab environments, although I have a preference for Python. I enjoy trying new things and will push my own boundaries to test what I know and am capable of.

Employment History

- 2017 – · · · ■ **Senior Engineer.** Advanced Materials Division, Mintek, South Africa
- 2010 – 2017 ■ **Engineer.** Advanced Materials Division, Mintek, South Africa
Research in fields of powder metallurgy, and ceramics involving development and characterisation of materials by various techniques. Failure analysis of failed components. Experience on analytical techniques and operation of Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), and X-Ray Diffractometer (XRD). Some experience on computational modelling of materials using thermodynamic, phase field, and molecular dynamics techniques.

Education

- 2017· · · ■ **Ph.D.** Texas A&M University, College Station, Texas, USA
Research Agenda: Thermodynamic and kinetic modeling of material microstructures within multidisciplinary design frameworks. Neural network featurization of microstructures for the purposes of predicting properties or processing parameters.
- 2014-2016 ■ **Master's Degree** University of the Witwatersrand, Johannesburg, South Africa
Dissertation Topic: The effect of processing route on the structure and properties of an Fe-Al alloy with additions of precious metals
- 2006-2009 ■ **Undergraduate Degree** University of the Witwatersrand, Johannesburg, South Africa
Awards::
2006 & 2007: Dean's List,
2008: Prof S Luyckx Prize in Physical Properties of Materials,
2009: SAIMM Prestige Prize (Metallurgy)
- 2005 ■ **Matric Certificate** Maritzburg College, Pietermaritzburg, South Africa

Academic Publications

Journal Articles

- R.A. Couperthwaite, L.A. Cornish, I.A. Mwamba, M.J. Papo, Effect of processing route on the microstructure and properties of an Fe-Al alloy with additions of precious metal, Materials Today: Proceedings, 2, 2015, 3932 – 3942
- B.O. Odera, M.J. Papo, R. Couperthwaite, G.O. Rading, D. Billing, L.A. Cornish, High-order additions to platinum-based alloys for high-temperature applications, Journal of the SAIMM, Volume 115, 2015, 241-250
- R.A. Couperthwaite, L.A. Cornish, I.A. Mwamba, Cold-spray coating of an Fe-40 at.% Al alloy with additions of ruthenium, Journal of the SAIMM, Volume 116, 2016, 927-934

Academic Publications (continued)

Conference Presentations

- R.A. Couperthwaite, I.A. Mwamba, Effect of platinum group metal additions on the oxidation behaviour of Fe-40 at.% Al, AMI Precious Metals 2013 Conference, 14 – 16 October 2013, Cape Town, South Africa
- R.A. Couperthwaite, L.A. Cornish, I.A. Mwamba, M.J. Papo, Effect of processing route on the microstructure and properties of an Fe-Al alloy with additions of precious metal, 7th International Symposium On Macro- and Supramolecular Architectures and Materials, 24 – 26 November 2014, Johannesburg, South Africa
- R.A. Couperthwaite, I.A. Mwamba, L.A. Cornish, EBSD analysis of an FeAl alloy produced by two different methods, 53rd Annual Conference of the Microscopy Society of Southern Africa, 30 November – 3 December 2015, Pretoria, South Africa
- R.A. Couperthwaite, L.A. Cornish, I.A. Mwamba, Cold-spray coating of an Fe-40 at.% Al alloy with additions of ruthenium, AMI Ferrous and Base Metals Development Network Conference, 19-21 October 2016, Durban, South Africa
- R.A. Couperthwaite, R. Arroyave, Estimation of Dual-Phase Steel Properties from Composition, CALPHAD XLVII, 27 May-01 June 2018, Queretaro, Mexico
- R.A. Couperthwaite, R. Arroyave, I. Karaman, A. Srivastava, D. Allaire, Thermodynamic Design of Dual-Phase Steels Within an Information-Fusion Framework, TMS 2019 Conference, 10-14 March 2019, San Antonio, Texas, USA
- R.A. Couperthwaite, L. McClenny, J. James, V. Attari, R. Arroyave, U. Braga-Neto, Utilizing Convolutional Neural Networks for Prediction of Process and Material Parameters from Microstructural Images, TMS 2020 Conference, 23-28 February 2020, San Diego, California, USA
- R.A. Couperthwaite, R. Arroyave, I. Karaman, A. Srivastava, D. Allaire, A Model Fusion Approach to Modeling Microstructure Development during Heat Treatment, TMS 2020 Conference, 23-28 February 2020, San Diego, California, USA

Skills

- Python ■ Advanced coding of statistical and machine learning applications
 Python package development
 Python based GUI application development
- SEM ■ Experience operating SEM for imaging, EDX and EBSD analysis
- XRD ■ Operated Bruker XRD for powder and solid material diffraction analysis

Miscellaneous

External Examination

- 2015 ■ University of the Witwatersrand, CHMT2016, Dr. Lesley Chown
 ■ University of the Witwatersrand, CHMT3025, Dr. Lesley Cornish
- 2016 ■ University of the Witwatersrand, CHMT2016, Dr. Lesley Cornish

Training

Title	Date	Venue
Analytical Electron Microscopy Workshop	18-20 October 2010	Nelson Mandela Metropolitan University
DST-TAP Foundry Course on Metallography, Interpretation and Measurement of Microstructures and Fractures	6-10 June 2011	Mintek
EDAX EBSD Training Course	20-22 June 2011	EDAX, Tilburg, Netherlands
EDAX Genesis EDS Training Course	23-24 June 2011	EDAX, Tilburg, Netherlands
Fire Warden Training	29 June 2011	Mintek
Advanced Project Management Workshop	22-23 August 2011	Mintek
X-Ray Powder Diffraction and Rietveld Refinement Course	26-30 November 2012	University of the Witwatersrand
Occupational Health and Safety Representative Training	08 August 2014	Mintek (Facilitated by NOSA)
Design and Analysis of Experiments Course	10-13 March 2015	University of the Witwatersrand
SASSDA Fundamentals of Stainless Steel Course	11 April 2016	SASSDA Offices, Johannesburg, South Africa
IIMEC School on Computational Materials Science Across Scales	18-29 July 2016	Texas A&M University, College Station, Texas

References

- Dr. Raymundo Arroyave  Professor (Texas A&M University)
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- Dr. Ankit Srivastava  Associate Professor (Texas A&M University)
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- Dr. Lesley Cornish  Professor (University of the Witwatersrand)
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- Dr. Jones Papo  Manager: Advanced Materials Division (Mintek)
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