

# Ben Sloman

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## Current Position

October 2018–Present **Research Scientist**, *Elkem Technology, Elkem ASA*.  
Applying mathematical modelling to silicon and ferrosilicon furnaces.

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## Education

September 2014–September 2018 **DPhil in Mathematics**, *St. Anne's College, University of Oxford*.  
Centre for Doctoral Training in Industrially Focused Mathematical Modelling.

September 2013–July 2014 **Postgraduate Certificate in Education - Mathematics**, *Worcester College, University of Oxford*.  
Placement schools - King Alfred's Academy, Wantage, and The Marlborough School, Woodstock.

October 2009–June 2013 **MMath in Mathematics**, *Worcester College, University of Oxford, First Class Honours*.

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## Publications

- [1] B.M. Sloman, C.P. Please, and R.A. Van Gorder. Homogenisation of a shrinking core model for gas-solid reactions in granular particles. *SIAM Journal on Applied Mathematics*, 79(1):117–206, 2019.
- [2] B.M. Sloman, C.P. Please, and R.A. Van Gorder. Asymptotic analysis of a silicon furnace model. *SIAM Journal on Applied Mathematics*, 78(2):1174–1205, 2018.
- [3] B.M. Sloman, C.P. Please, R.A. Van Gorder, A.M. Valderhaug, R.G. Birkeland, and H. Wegge. A heat and mass transfer model of a silicon pilot furnace. *Metallurgical and Materials Transactions B*, 48(5):2264–2276, 2017.

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## Research

October 2015–September 2018 **DPhil Research Project - Mathematical modelling of silicon furnaces**, *Oxford University, in collaboration with Elkem ASA*.  
Mathematical modelling of heat transfer, chemical reactions, and gas flow in the silicon furnace. Numerical and asymptotic methods are used to analyse models and improve furnace performance. Supervisors: Colin Please and Robert Van Gorder.

July–September 2015 **InFoMM CDT Mini-Project - Multi-Level Monte Carlo for 1-D edge plasma fluid model**, *Oxford University, in collaboration with Culham Centre for Fusion Energy*.

May–July 2015 **InFoMM CDT Mini-Project - Modelling the inner structure in a silicon furnace**, *Oxford University, in collaboration with Elkem ASA*.

July–September 2010 **STOR-i Internship - Selecting a portfolio in finance**, *Lancaster University*.  
Optimising portfolio choice assuming stock returns fit a multinomial normal distribution.

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## Participation in Academic Events

July 2019 **20th European Conference on Mathematics for Industry (ECMI)**, *Valencia, Spain*.  
Minisymposium talk: Homogenisation of a shrinking core model for gas-solid reactions in granular particles.

April 2019 **British Applied Mathematics Colloquium (BAMC)**, *University of Bath*.  
Contributed talk: Homogenisation of a shrinking core model for gas-solid reactions in granular particles.

August 2018 **2018 Industrial Problem Solving Workshop (IPSW)**, *University of Calgary, Canada*.  
Worked on estimating the height of foliage obscured landscapes using drone data.

- June 2018 **20th European Conference on Mathematics for Industry (ECMI)**, *Budapest, Hungary*.  
Minisymposium talk: Heat transfer and chemical reactions in a silicon furnace.
- June 2017 **Industrial and Applied Mathematics Seminar**, *University of Oxford*.  
Seminar talk: Asymptotic analysis of a silicon furnace model.
- May 2017 **European Study Group with Industry (ESGI 127)**, *University of Aveiro, Portugal*.  
Wrote report on reducing the cost and duration of homelessness.
- April 2017 **British Applied Mathematics Colloquium (BAMC)**, *University of Surrey*.  
Contributed talk: Asymptotic analysis of a silicon furnace model.
- April 2016 **SIAM Student Chapter Conference**, *University of Oxford*.  
Poster presentation: Mathematical evaluation of optimal design of silicon furnaces.
- April 2016 **European Study Group with Industry (ESGI 116)**, *University of Durham*.  
Worked on the electrical properties of a calciner.
- March 2016 **British Applied Mathematics Colloquium (BAMC)**, *University of Oxford*.  
Poster presentation: Mathematical evaluation of optimal design of silicon furnaces.
- March 2015 **European Study Group with Industry (ESGI 107)**, *University of Manchester*.  
Worked on the stability of the interface between viscous slag and an inviscid alloy.
- March 2015 **InFoMM UK Graduate Modelling Camp**, *University of Oxford*.

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## Teaching Experience

- 2017–2018 **Graduate Development Scholar**, *St. Anne's College, University of Oxford*.  
Gave tutorials for pairs of first year students in Fourier Series and Partial Differential Equations, and second year students in Quantum Mechanics, Differential Equations II, Integral Transforms, and Calculus of Variations.
- 2017 **Non-stipendiary lecturer**, *Mansfield College, University of Oxford*.  
Gave tutorials for pairs of first year students in Introductory Calculus, and second year students in Fluid Dynamics, Integral Transforms, and Calculus of Variations.
- 2017 **College Tutor**, *University of Oxford*.  
Gave tutorials for pairs of second year students in Fluid Dynamics at Balliol, Exeter, and Trinity Colleges.
- 2016–2017 **Department Tutor**, *Mathematical Institute, University of Oxford*.  
Taught classes for 10-20 fourth year students in Solid Mechanics and gave consultation sessions for 30-40 third year students for Viscous Flow.
- 2016 **Graduate Course Instructor**, *Mathematical Institute, University of Oxford*.  
InFoMM CDT (DPhil) course Modelling, Analysis and Computation of Continuous Real-World Problems.
- 2015–2016 **Department Teaching Assistant**, *Mathematical Institute, University of Oxford*.  
Assisted with running classes for 10-20 third year students in Applied Partial Differential Equations, Viscous Flow, and Waves and Compressible Flow.
- 2013–14 **Trainee Teacher (P.G.C.E)**, *University of Oxford*.  
Taught Mathematics in two comprehensive schools in Oxfordshire as part of teaching development, alongside pedagogical training in the Department of Education.

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## Outreach

- March 2017 **STEM for Britain finalist**.  
Presented a poster of my research to a group of MPs in the House of Commons.
- 2016–Present **Outreach to schools**.  
Taught lessons to sixth form students demonstrating the uses of Applied Mathematics, by considering population dynamics and networks.

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## Programming and Software Skills

Matlab, Mathematica, Comsol, L<sup>A</sup>T<sub>E</sub>X, R (basic), Microsoft Office including Excel.