

# Richard West

Department of Chemical Engineering, 342SN  
Northeastern University,  
360 Huntington Avenue,  
Boston MA 02115

Email: r.west@neu.edu  
Web: <http://www.neu.edu/comocheng/>  
Phone: (617) 615-9378

## Education

**University of Cambridge, UK** 2004 – 2008  
Ph.D. Chemical Engineering  
Modelling the Chloride Process for Titanium Dioxide Synthesis

**University of Cambridge, UK** 2000 – 2004  
M.Eng. Chemical Engineering  
First class with honours

**Massachusetts Institute of Technology, USA** 2001 – 2002  
Undergraduate exchange programme (Chemical Engineering)  
GPA: 4.9/5.0

**Queen Elizabeth High School, Hexham, UK** 1995 – 2000  
'S' level Physics (distinction) and 5 'A' levels at Grade A:  
Chemistry, Physics (top 5 in UK), Maths, Further Maths, General Studies

## Research Experience

**Assistant Professor** 2011 – present  
Chemical Engineering Northeastern University  
Building detailed kinetic models of complex and catalytic reacting systems, for energy applications.

**Postdoctoral Research Associate** 2008 – 2011  
Prof. William H. Green Massachusetts Institute of Technology  
Kinetic model generation: developing automatic reaction mechanism generation software (RMG) to study the liquid phase autoxidation of hydrocarbons; automating the process of estimating solvation thermodynamics, improving estimation methods, and exploring new cheminformatics tools. Multi-physics modeling of deposit formation in diesel fuel injectors.

**Ph.D.** 2004 – 2008  
Dr. Markus Kraft University of Cambridge  
Modelling combustion synthesis of TiO<sub>2</sub> nanoparticles: found new thermochemical data using computational quantum chemistry (*J. Phys. Chem. A* **111**, 3560, 2007); developed first elementary-step reaction mechanism for TiCl<sub>4</sub> oxidation (*Ind. Eng. Chem. Res.* **46**, 6147, 2007; *Combust. Flame* **156**, 1764, 2009); extended a stochastic particle population balance solver to track primary particles (*ibid.*). See also attached list of publications and presentations.

**Final year research project** 2003 – 2004  
Dr. Vassilios Vassiliadis University of Cambridge  
Combinatorial optimisation: implemented, developed and analysed a variety of multivariate optimization algorithms and test cases in C++.

### Undergraduate research project (UROP)

2002

Prof. Clark Colton

Massachusetts Institute of Technology

Web-lab development: improved control algorithm on heat-exchanger rig in teaching laboratory with web-based interface. Worked with professors and students to expand use of the lab into other courses, devised experiments and prepared teaching materials.

## Computing Experience

**Languages:** Python, Java, Fortran, Perl, Matlab, C++, PHP, MySQL, XML, Ajax.

**Chemistry:** RMG, Gaussian, Cantera, Chemkin, Materials Studio, DMol<sup>3</sup>, GAMESS, JMol.

**Publishing:** L<sup>A</sup>T<sub>E</sub>X, MS Office, InDesign, Quark, iWork.

**Graphics:** Illustrator, ChemDraw, Photoshop.

## Teaching Experience

### Assistant Professor

20011 – present

Lecturing CHME 7330: Graduate level Thermodynamics.

### Research supervision

2008 – 2011

Supervised two undergraduate summer research projects and assisted in advising numerous graduate students at MIT.

### Research supervision

2007 – 2008

Co-supervised two first-year PhD students in computational chemistry and mechanism development during final year of my PhD.

### Undergraduate teaching

2005 – 2007

Small group teaching (“supervisions”) in undergraduate chemical engineering courses:

- \* Equilibrium Thermodynamics
- \* Materials Science and Corrosion
- \* Probability and Statistics
- \* Health, Safety and the Environment.

## Work Experience

### Innovia Technology

Summer 2004

Associate

Cambridge, UK

Innovation consultancy: conducted research, participated in and chaired brainstorms, and prepared presentations for a number of projects.

### BP

Summer 2003

Intern

Grangemouth, UK

Process engineering: responsible for several projects and plant modifications. Worked with operators, engineers and management. Assisted other team members with larger de-bottlenecking work.

## Publications

- \* A. Jalan, R. W. Ashcraft, **R. H. West**, and W. H. Green. Predicting solvation energies for kinetic modeling. *Annu. Rep. Prog. Chem., Sect. C*, 106:211–258, 2010.
- \* **R. H. West**, R. A. Shirley, M. Kraft, C. F. Goldsmith, and W. H. Green. A detailed kinetic model for combustion synthesis of titania from TiCl<sub>4</sub>. *Combust. Flame*, 156(9):1764–1770, 2009.

- ★ R. Shirley, Y. Liu, T. S. Totton, **R. H. West**, and M. Kraft. First-principles thermochemistry for the combustion of a  $\text{TiCl}_4$  and  $\text{AlCl}_3$  mixture. *J. Phys. Chem. A*, 113(49):13790–13796, 2009.
- ★ M. Sander, **R. H. West**, M. S. Celnik, and M. Kraft. A detailed model for the sintering of polydispersed nanoparticle agglomerates. *Aerosol Sci. Technol.*, 43(10):978–989, 2009.
- ★ W. Phadungsukanan, S. Shekar, R. Shirley, M. Sander, **R. H. West**, and M. Kraft. First-principles thermochemistry for silicon species in the decomposition of tetraethoxysilane. *J. Phys. Chem. A*, 113(31):9041–9049, 2009.
- ★ A. Raj, M. S. Celnik, R. A. Shirley, M. Sander, R. I. A. Patterson, **R. H. West**, and M. Kraft. A statistical approach to develop a detailed soot growth model using PAH characteristics. *Combust. Flame*, 156(4):896–913, 2009.
- ★ M. S. Celnik, M. Sander, A. Raj, **R. H. West**, and M. Kraft. Modelling soot formation in a premixed flame using an aromatic-site soot model and an improved oxidation rate. *Proc. Combust. Inst.*, 32(1):639–646, 2009.
- ★ M. S. Celnik, A. Raj, **R. H. West**, R. I. A. Patterson, and M. Kraft. Aromatic site description of soot particles. *Combust. Flame*, 155(1–2):161–180, 2008.
- ★ M. S. Celnik, **R. H. West**, N. M. Morgan, M. Kraft, A. Moisala, J. Wen, W. H. Green, and H. Richter. Modelling gas-phase synthesis of single-walled carbon nanotubes on iron catalyst particles. *Carbon*, 46(3):422–433, 2008.
- ★ **R. H. West**, M. S. Celnik, O. R. Inderwildi, M. Kraft, G. J. O. Beran, and W. H. Green. Toward a Comprehensive Model of the Synthesis of  $\text{TiO}_2$  Particles from  $\text{TiCl}_4$ . *Ind. Eng. Chem. Res.*, 46(19):6147–6156, 2007.
- ★ **R. H. West**, G. J. O. Beran, W. H. Green, and M. Kraft. First-principles thermochemistry for the production of  $\text{TiO}_2$  from  $\text{TiCl}_4$ . *J. Phys. Chem. A*, 111(18):3560–3565, 2007.
- ★ C. Colton, M. Knight, R. Khan, S. Ibrahim, and **R. H. West**. A web-accessible heat exchanger experiment. In W. Aung, R. Altenkirch, T. Cermak, R. W. King, and L. M. S. Ruiz, editors, *INNOVATIONS 2004: World Innovations in Engineering Education and Research*, chapter 10. iNEER, Arlington, VA, USA, 2004.

## Conference Presentations

- ★ AIChE Annual Meeting. *Automatic Reaction Mechanism Generation with Group Additive Kinetics*. Minneapolis, MN, USA. 16th–21st October, 2011
- ★ AIChE Annual Meeting. *Multiphysics Model of Diesel Injector Deposit Formation*. Minneapolis, MN, USA. 16th–21st October, 2011
- ★ 7th U.S. National Combustion Meeting. *Kinetic Modeling of Methyl Formate Oxidation*. Atlanta, GA, USA. 20th–23rd March, 2011
- ★ AIChE Annual Meeting. *Building Models of Liquid Phase Kinetics and Separation: Hydrocarbon Autoxidation*. Salt Lake City, UT, USA. 7th–12th November, 2010
- ★ ACS Fall 2010 National Meeting. *Reaction Mechanism Generator: Cheminformatics for Kinetic Modeling*. (CINF Flash talk). Boston, MA, USA. 22nd–26th August, 2010
- ★ 28th Annual Regional Kinetics and Dynamics Meeting. *Automatically Building Kinetic Models for the Liquid Phase*. Trinity College, Hartford, CT, USA. 30th January, 2010
- ★ AIChE Annual Meeting. *Building Kinetic Models for the Liquid Phase: Hydrocarbon Autoxidation*. Nashville, TN, USA. 8th–13th November, 2009
- ★ 27th Annual Regional Kinetics and Dynamics Meeting. *Predictive kinetics: Modeling the oxidation of  $\text{TiCl}_4$  and formation of  $\text{TiO}_2$* . University of Massachusetts, Amherst, MA, USA. 31st January, 2009

- \* IChemE Particle Technology Subject Group Meeting. *Multi-scale Modelling of the Combustion Synthesis of Titania Nanoparticles*. Edinburgh, UK. 24th January, 2007
- \* AIChE Annual Meeting. *Modelling the Combustion Synthesis of Titania Nanoparticles*. San Francisco, CA, USA. 12th–17th November, 2006

## Industrial Seminars

- \* Tioxide Europe Ltd, Billingham, UK. *Modelling the Combustion Synthesis of Titania Nanoparticles*. 27th April, 2007.
- \* DuPont Titanium Technologies, Wilmington, DE, USA. *Multi-scale Modelling of the Combustion Synthesis of Titania Nanoparticles*. 20th November, 2006.

## Posters

- \* **R. H. West**, J. W. Allen, and W. H. Green. Kinetics Estimates by Group Contribution for Automatic Reaction Mechanism Generation. *7th International Conference on Chemical Kinetics*. Cambridge, MA, 10th–14th July, 2011
- \* **R. H. West**. Predictive Kinetics for Chemical Engineering *AIChE Annual Meeting*. Salt Lake City, UT, USA. 7th–12th November, 2010
- \* **R. H. West**, C. F. Goldsmith, M. R. Harper, and W. H. Green. Kinetic Modeling of Methyl Formate Oxidation. *Annual Conference for the Combustion Energy Frontier Research Center*. Princeton, NJ, 23rd–24th September, 2010
- \* **R. H. West**, C. F. Goldsmith, W. H. Green, L. Catoire, and N. Chaumeix. Methyl Formate Oxidation: High-Temperature Kinetics. *33rd International Symposium on Combustion*. Beijing, China, 1st–6th August, 2010
- \* L. Catoire and **R. H. West**. Kinetics of Glucose Energetic Conversion. *33rd International Symposium on Combustion*. Beijing, China, 1st–6th August, 2010
- \* **R. H. West**, M. R. Harper, and W. H. Green. 21<sup>st</sup> Century Kinetics: Quantitative Predictions from First Principles *8th World Congress of Chemical Engineering*. Montreal, Canada, 23rd–27th August, 2009
- \* **R. H. West**, R. A. Shirley, M. Kraft, C. F. Goldsmith, and W. H. Green. A Detailed Kinetic Model for Combustion Synthesis of Titania from  $\text{TiCl}_4$ . *32nd International Symposium on Combustion*. Montreal, Canada, 3rd–8th August, 2008
- \* A. Raj, M. S. Celnik, R. I. Patterson, **R. H. West**, and M. Kraft. A Statistical Approach to Develop a Detailed Soot Growth Model Using PAH Characteristics. *32nd International Symposium on Combustion*. Montreal, Canada, 3rd–8th August, 2008
- \* W. Phadungsukanan, A. Raj, **R. H. West**, M. Sander, M. S. Celnik, and M. Kraft. Soot Database and PrIME: Past, Present and Future. *32nd International Symposium on Combustion*. Montreal, Canada, 3rd–8th August, 2008
- \* A. Raj, M. S. Celnik, R. I. A. Patterson, **R. H. West**, and M. Kraft. Advanced Soot Particle Modelling: Current and Future. *8th UK Particle Technology Forum*. Cambridge, UK, 26th–27th September, 2007
- \* M. S. Celnik, **R. H. West**, N. M. Morgan, M. Kraft, A. Moisala, J. Wen, W. H. Green, and H. Richter. Modelling gas-phase carbon nanotube synthesis on iron particles from carbon monoxide. *3rd International Conference on Population Balance Modelling*. Quebec City, Canada, 19th–21st September, 2007
- \* M. S. Celnik, A. Raj, R. I. A. Patterson, **R. H. West**, and M. Kraft. Advanced Soot Particle Modelling: Current and Future. *International Workshop on Combustion-Generated Fine Carbon Particles*. Anacapri, Italy, 13th–16th May, 2007

- ★ **R. H. West**, W. H. Green, and M. Kraft. *TiCl<sub>4</sub> Oxidation Chemistry for Combustion Synthesis of TiO<sub>2</sub> Nanoparticles*. *31st International Symposium on Combustion*. Heidelberg, Germany, 6th–11th August, 2006

## Professional Service & Associations

- ★ Member of AIChE (since 2006), ACS (since 2010), IChemE (2003–4).
- ★ Reviewer for *International Journal of Chemical Kinetics* and *Journal of Chemical Information and Modeling*.
- ★ Graduate Student representative on the Chemical Engineering Syndicate (equivalent to faculty board) and departmental Staff–Student Consultative Committee (2006).
- ★ Chemical Engineering representative on the university's Graduate Union Council (2006).
- ★ Publicity officer for the Cambridge University Chemical Engineering Society (2003–4).
- ★ President of the Clare Dilettante Society, organizing and chairing seminars for students and faculty (2003–4).

## Other Interests

**Entrepreneurship:** Conceived, designed and created profitable *Posters* Facebook application, reaching 25,000 users within 6 months (2007).

**Photography:** Cambridge *Varsity* newspaper (2003–7), freelance work for university departments, colleges, societies and institutions (2005–8), MIT Yearbook (2001–4).

**Other:** Orchestral and chamber music (violin); sailing; cycling; snowboarding.

## References

References available on request.