Graham John Hutchings FRS — Curriculum Vitae

Date of birth: 3rd February 1951

Website: http://www.cardiff.ac.uk/chemy/contactsandpeople/academicstaff/hutchings.html

Education and Qualifications:

1972	BSc in Chemistry with First Class Honours, University College London
1975	PhD in Biological Chemistry, University College London. Supervisor: Prof C Vernon
2002	DSc (University of London)

Professional Appointments:

1975– 1984	ICI Petrochemicals Division
1975– 1978	Technical Officer, Research Department Wilton, Teeside
1978– 1981	Plant Manager and Production Support manager, Oil Works, Teeside
1981– 1983	Senior Research Officer, AECI, Modderfontein, S Africa (Seconded)
1983– 1984	Chief Research Officer, AECI, Modderfontein, S Africa (Seconded)
1984– 1987	University of Witwatersrand, S Africa
1984– 1987	Lecturer (1984-6),Senior Lecturer (1986-7)in Chemistry
1987	Professor
1987– 1997	University of Liverpool
1987 – 1994	Assistant Director of the Leverhulme Centre for Innovative Catalysis
1994 – 1997	Deputy Director and Professor
1997 – 2009	Cardiff University
1997– 2006	Head of School and Professor of Physical Chemistry
2006– present	Distinguished Research Professor
2008 – present	Director: Cardiff Catalysis Institute
2010 – 2012	Pro Vice-Chancellor Research

Prizes/ Distinctions

- Langmuir Distinguished Lecturer Award, Division of Colloid and Surface,Science, ACS, August 1996.
- Member of the Fachbeirat of the Fritz-Haber-Institut, Berlin, 1999-2015.
- Member of Sasol (South Africa) Heterogeneous Catalysis Advisory Board : 2000-2009.
- Member of NIOK International Review Group 2000, 2006, 2010 (Chair).
- DGMK 2001 – Kolleg Lectureship, Germany, 2001.
- Invited Professor in Residence at the Université Pierre et Marie Curie, Paris, 2003-4.
- IChemE Entech Medal 2004.
- Appointed RAE panel member for Chemistry (Panel 18) 2005-2008.
- RSC 2004 Award for Heterogeneous Catalysis.

- 2006 François Gault Lecturer of the European Federation of Catalysis Societies
- I Chem E Impact Award for Applied Catalysis 2005.
- RSC Green Chemistry Lecturer 2007.
- IChemE Environwise Award for Green Chemistry 2007.
- Winner Dow Methane Challenge 24th January 2008.
- Elected Fellow of the Royal Society 2009
- RSC Award for Surfaces and Interfaces 2009
- I Chem E Sustainability Award 2009
- Appointed chair of SCORE 2010-2013
- Elected member Academia Europaea September 2010
- Elected Founding Fellow Learned Society of Wales
- Appointed REF Panel member and Deputy Chair for Chemistry (Panel B8) 2011-2014.
- Appointed President Elect of the Faraday Division of RSC 2010 President 2012-2015.
- IPMI Henry J. Albert Award 2011
- France Great Britain Chemistry Prize 2011
- Dechema Alvin Mittasch Award 2012
- International Association of Catalysis Societies Heinz Heinemann Award 2012
- Thompson Reuters Citation Laureate September 2012
- Distinguished Visiting Lecturer, Catalysis Society of South Africa, 2013.
- Royal Society Davy Medal 2013
- Dewar Lectureship, Queen Mary College, London.
- Thompson Reuters Most Cited Scientist Award 2014

Publications:

672 publications (560 refereed journal research articles; 42 Patents; 53 Review articles; 17 Edited works, 20302 citations (Web of Science 26.10.14), h-index 65, over 210 Research lecture presentations.

Selected Research Publications:

1. S.E. Colley, R.G. Copperthwaite, G.J. Hutchings, S.P. Terblanch and M.M. Thackaray, 'Identification of body-centred cubic cobalt and its importance in CO hydrogenation', *Nature*, 339 (1989) 129-130.
2. J.S.J. Hargreaves, G.J. Hutchings and R.W. Joyner, 'Control of product selectivity in the partial oxidation of methane', *Nature*, 348 (1990) 428-429.
3. G.J. Hutchings, A. Desmartin Chomel, R. Olier and J.C. Volta, Role of the product in the transformation of a catalyst to its active site', *Nature*, 368 (1994) 41-45.

4. D.W. Lewis, D.J. Willock, C.R.A. Catlow, J.M. Thomas and G.J. Hutchings, '*De-novo* design of structure-directing agents for the synthesis of microporous solids', *Nature*, 382 (1996) 604-606.
5. G.J. Hutchings, C.S. Heneghan, I.D. Hudson and S.H. Taylor, 'Uranium-oxide-based catalysts for the destruction of chloro-organic compounds', *Nature*, 384 (1996) 341-343.
6. M.D. Hughes, Y.-J. Xu,; P. Jenkins, P. McMorn, P.Landon, D.I. Enache, A.F. Carley, G.A. Attard, G.J. Hutchings, F. King, E.H. Stitt, P. Johnston, K. Griffin and C.J. Kiely, "Tunable gold catalysts for selective hydrocarbon oxidation under mild conditions", *Nature*, 437 (2005) 1132-1135.
7. D.I Enache, J. K. Edwards, P. Landon, B. Solsona-Espriu, A. F. Carley, A. A. Herzing, M. Watanabe, C. J. Kiely, D. W. Knight and G. J. Hutchings, "Solvent-free oxidation of primary alcohols to aldehydes using titania-supported gold-palladium catalysts", *Science*, 311 (2006) 362-365.
8. M. Conte, G. Budroni, J. K. Bartley, S. H. Taylor, A. F. Carley, A. Schmidt, D. M. Murphy, F. Girgsdies, T. Ressler, R. Schlögl, and G. J. Hutchings "Chemically Induced Fast Solid State Transitions of ω-$VOPO_4$ in Vanadium Phosphate Catalysts", *Science*, 313 (2006) 1270-1273.
9. Andrew A. Herzing, Christopher J. Kiely, Albert F. Carley, Philip Landon and Graham J. Hutchings "Identification of Active Gold Nanoclusters on Iron Oxide Supports for CO Oxidation" *Science*,321 (2008) 1331-1335.
10. J. K. Edwards, B. Solsona, Edwin Ntainjua N, A. F. Carley, A. A. Herzing, C. J. Kiely and G. J. Hutchings, "Switching-off Hydrogen Peroxide Hydrogenation in the Direct Synthesis Process" *Science*, 323 (2009) 1037-1041.
11. L. Kesavan, R. Tiruvalam, M. H. Ab Rahim, M. I. bin Saiman, D. I. Enache, R. L. Jenkins, N. Dimitratos, J. A. Lopez-Sanchez, S. H. Taylor, D. W. Knight, C. J. Kiely, G. J. Hutchings "Solvent-Free Oxidation of Primary Carbon-Hydrogen Bonds in Toluene Using Au-Pd Alloy Nanoparticles" *Science*, 331 (2011) 195-199.
12. J.A. Lopez-Sanchez, N. Dimitratos, S. White, G. Brett, L. Kesavan, P. Miedziak, R. Tiruvalam, R.L. Jenkins, A.F. Carley, D. Knight, C.J. Kiely and G.J. Hutchings, "Facile removal of stabilizer-ligands from supported gold nanoparticles" *Nature Chemistry* **3** (2011) 551-556.

13 S. Pradhan, J.K. Bartley, D. Bethell, A.F. Carley, M. Conte, S. Golunksi, M.P. House, R.L. Jenkins, R. Lloyd and G.J. Hutchings "Non-lattice surface oxygen species implicated in the catalytic partial oxidation of decane to oxygenated aromatics" *Nature Chem.*, **4** (2012) 134-139

14 M. Sankar, Q. He, M. Morad, J. Pritchard, S.J. Freakley, J.K. Edwards, S.H. Taylor, D.J. Morgan, A.F. Carley, D.W. Knight, C.J. Kiely and G.J. Hutchings "Synthesis of Stable Ligand-free Gold-Palladium Nanoparticles Using a Simple Excess Anion Method" *ACS Nano*, **6** (2012) 6600-6613

15 M.H. Ab Rahim, M.M. Forde, R.L. Jenkins, C. Hammond, Q. He, N. Dimitratos, J.A. Lopez-Sanchez, A.F. Carley, S.H. Taylor, D.J. Willock, D.M. Murhpy, C.J. Kiely and G.J. Hutchings "Oxidation of Methane to Methanol with Hydrogen Peroxide Using Supported Gold-Palladium Alloy Nanoparticles" *Angew. Chem. – Int Ed.*, **52** (2013) 1280-1284

16 M.M. Forde, R.D. Armstrong, C. Hammond, Q. He, R.L. Jenkins, S. Kondrat, N. Dimitratos, J.A. Lopez-Sanchez, S.H. Taylor, D. Willock, C.J. Kiely and G.J. Hutchings "Partial Oxidation of Ethane to Oxygenates Using Fe- and Cu- Containing ZSM-5" *J. Amer. Chem. Soc*., **135** (2013) 11087-99

17 M. Sankar, E. Nowicka, E. Carter, D.M. Murphy, D.W. Knight, D. Bethell and G.J. Hutchings "The benzaldehyde oxidation paradox explained by the interception of peroxy radical by benzyl alcohol" *Nature Commun.,* **5** (2014) 3332; DOI: 10.1038/ncomms4332.

Significant Research Lectures

(Plenary Lecture) 'Nature of active sites in oxide catalysts', *Rideal Conference*, Reading, April 1993.

(Invited Lecture) 'Oxidation catalysis in the manufacture of fine chemicals' *8th Roemond Conference on Catalysis*, Kerkrade, the Netherlands, July 1994.

(Invited Lecture) 'Vanadium phosphate catalysts for the oxidation of butane' (invited lecture) *Sabatier Conference on Catalysis* , Strasbourg, July 1995.

(Keynote speaker) 'Catalytic Hydrocarbon Oxidation' *ACS Symp*. Chicago, USA, August 1995.

(Plenary Lecture) 'Towards the scientific design of oxidation catalysts', *Langmuir Lecture of the ACS Division of Colloid and Surface Science,* ACS meeting Orlando , August 1996

(Plenary Lecture) 'Designing oxidation catalysts', *IPCAT Congress*., Cape Town, January 1998.

(Keynote Lecture) 'Catalysis by gold', *Europacat V*, Limerick, September 2001.

(DGMK Kolleg Lecture) 'Asymmetric catalysis with zeolite' Stuttgart, 2001.

(Plenary Lecture) 'New directions in gold catalysis', *2nd Int. Gold Conf*., Vancouver, September 2003.

(Invited Lecture) "Catalysis by gold" *Gordon Conference on Catalysis*, New London, USA, June 2004.

(Plenary Lecture) "Oxidation catalysis", *North American Catalysis Conference* 2005.

(Keynote Lecture) "Green chemistry has a golden future", *Europacat 7,* 2005.

(Plenary Lecture) "Catalysis by gold", *3rd Cape Organometallic Conference*, Cape Town, October 2005.

(Plenary Lecture) "Methane activation", *CATSA*, Johannesburg, November 2005.

(Keynote lecture) "Catalysis using gold nanocrystals", *MRS*, Boston, USA, November 2005.

(Plenary Lecture) "Green catalysis by gold" *Polish Annual Catalysis* Meeting, Krakow, March 2006.

(Plenary Lecture) "Designing selective oxidation catalysts" *Nordic Catalysis Conference,* Trondheim, May 2006.

(Plenary Lecture) "Heterogeneous enantioselective reactions using modified zeolites" *BZA 29th Annual Meeting*, Ambleside, July 2006.

(Invited Lecture) "Green oxidation using gold" *Gordon Research Conference* Oxford, August 2006.

(Plenary Lecture) "Green catalysis with gold" *Gold 2006* Limerick September 2006.

(Plenary lecture) “Selective oxidation catalysis using supported gold and gold palladium nanocrystals” *233rd ACS meeting Chicago*, March 2007.

(RSC Green Chemistry Lecture) “Green oxidation catalysis using gold” *GSC-3 Delft* July 2007

(Keynote lecture) “Gold Catalysis using Heterogeneous & Homogeneous Catalysts”, *ISHH -13* Berkeley California July 2007

(Invited lecture) “Direct synthesis of hydrogen peroxide from H_2 and O_2 using supported Au-Pd catalysts”, *RSC Faraday Discussion*, Birmingham, September 2007

(François Gault Lecture) “Selective oxidation catalysis using supported gold nanocrystals”, *Sabatier Conference* Strasbourg, September 2007

(Invited Lecture, representing RSC) “Green Catalysis with Gold”, *Mendeleev Conference*, Moscow, September 2007

(Invited Keynote Lecture) “Green Catalysis with alternative feedstocks” *235th ACS meeting New Orleans*, April 2008.

(Invited Keynote Lecture) “Recent advances is selective catalysis using supported gold nanoparticles” *14th International Congress on Catalysis*, Seoul, July 2008.

(invited Lecture) “Recent advances is selective catalysis using supported gold nanoparticles” *50th Anniversary Meeting of Japanese Catalysis Society*, Kyoto 2008

(Plenary Lecture) “Nanocrystalline gold and gold palladium alloy catalysts: A reflection on catalyst discovery and the nature of active sites” *Gold 2009*, Heidelberg 2009.

(RSC Prize Lecture) “Designing Heterogeneous Catalysis” Cardiff, 2009.

(Plenary Lecture) “Methane Activation”, IDECAT meeting, France 2010

(Invited Lecture) “Catalysis using gold and gold palladium nanoparticles”, ACS San Francisco, 2010

(Plenary lecture) “Catalysis using gold and gold palladium catalysts” 37th Italian Inorg. Chem. Cong. Trieste 2010

(Plenary Lecture) “Catalysis using gold and gold palladium nanoparticles” *ISHH -13* Berlin, 2011

(Invited Lecture) “Methane activation” *IDECAT* Bertoroni Italy 2011.

(Invited Lecture) “Nanocrystalline gold catalysts for selective oxidation” *ACS* Denver 2011.

(Keynote Lecture) “Catalysis by gold and gold palladium nanoparticles” *XXXIII RSEQ* Valencia 2011.

(Invited Lecture) “Catalysis by Gold” Gordon Research Conference on Noble Metals, USA 2012.

(Gt Britain France Prize Lecture) “Catalysis and Green Chemistry” Paris, 2012.

(Gt Britain France Prize Lectures) “Methane Activation”, “Catalysis by Gold”, Lyon 2012.

(Plenary Lecture) “Catalysis by gold and gold palladium nanoparticles” Nordic Catalysis Conference 2012.

(Invited Lecture) “Catalysis by gold and gold palladium nanoparticles” ACS San Diego, 2012.

(Keynote Lecture) “Catalysis by gold and gold palladium nanoparticles”2nd KACST Conference, Riyadh, 2012

(Plenary Lecture) “Catalysis by gold and gold palladium nanoparticles” Fine Chemicals Symposium Palermo, Italy 2012.

(Plenary Lecture, Heinz Heinemann Award) “Catalysis by gold and gold palladium nanoparticles” 15th ICCC, Munich 2012.

(Keynote Lecture) “Catalysis by gold and gold palladium nanoparticles” Gold 2012 Tokyo 2012

(Invited Lectures) “Catalysis by Gold” PCCP Asia Conference Series; three lectures inBeijing, Tsukuba, Seoul 2012.

(Gt Britain France Chemistry Prize Lecture) “Catalysis by gold nanoparticles” Poitier, 2012

(Plenary Lecture) “Catalysis using gold bimetallic nanoparticles” 2nd ChemEner Conference, Berlin 2013.

(Plenary Lecture) “Gold Catalysis – Recent Developments” 46th Jahrestreffen Deutscher Katalytiker Weimer, 2013.

(Plenary Lecture) “Synthesis and catalysis using gold nanoalloys for the conversion of renewable substrates” SuBiCat, St Andrews, 2013

(Keynote Lecture) “ Gold Catalysis – Recent Developments” Interdisciplinary Surface Science Conference ISSC-19 Nottingham, 2013

(Invited Lecture) “Switching-off toluene formation in the solvent-free oxidation of benzyl alcohol using supported trimetallic Au–Pd–Pt nanoparticles” Faraday Discussion 162, Berlin, 2013

(Keynote Lecture) “Alkane Activation by Selective Oxidation using FeCuZSM-5” NAM, Louisville, 2013

(Plenary Lecture) “Catalysis using supported Gold-Palladium Nanoparticles” IChemE Catalysis and Chemical Engineering, London, 2013

(Plenary Lecture) “Selective oxidation using supported gold nanoparticles” 7th World Congress on Oxidation Catalysis, St Louis, 2013

(Keynote Lecture) “Zeolite catalysts for selective methane oxidation” Minerals for Life, Edinburgh, 2013

(Invited Lecture) “Catalysis with gold-containing nanoparticles” Irsee VI, Germany, 2013.

(Lecture) “Alkane Activation by Selective Oxidation using FeCuZSM-5” Europacat, Lyon 2013.

(Invited Lecture) “Highly Active AuPd Nanoalloy Catalysts for the Direct Synthesis of Hydrogen Peroxide” University of Newcastle, 2013,

(Plenary Lecture) “The direct synthesis of hydrogen peroxide using supported gold nanoalloy catalysts” Kick off workshop for Gold Catalysis Research Centre of DICP, Dalian, 2013

(Invited Lecture) “Catalysis with gold-containing nanoparticles” ETH Zurich, 2013

(Invited Lecture) “Catalysis using supported gold- nanoalloys” iNano, University of Aarhus, Denmark, 2013

(Plenary Lecture) “Catalysis using supported Gold-Palladium Nanoparticles” 3rd Annual Postgraduate Conference on Nanotechnology, University of Birmingham, 2013

(Plenary Lecture) “Catalysis with gold-containing nanoparticles” Catsa, South Africa, 2013

(Invited Lectures as the distinguished Lecturer) a series of 6 lectures delivered at the Universities of Cape Town, Bloemfontein, Potchetstroom, UNISA and Durban, South Africa, November 2013

(Dewar Lecture) “Catalysis by Gold” Queen Mary College, London, 2014

(Invited Lecture) “Catalysis with gold-containing nanoparticles” Bangor University, 2014

(Invited Lecture) “Catalysis by Gold” BASF, Lugwigshaven, 2014

(Plenary Lecture) “Redox catalysis using gold and gold-containing nanoparticles” Tokyo Metopolitan Workshop on Gold, 2014

(Keynote Lecture) “Gold catalysis - recent developments” Tocat, Kyoto, 2014

(Invited Lecture) “Catalysis in the UK” Samsung, Seoul, S Korea, 2014

(Invited Lecture) “Heterogeneous Catalysis: challenges for theoretical and computational approaches”, Incat, London, 2014

(Keynote Lecture) “Catalysis using gold-containing nanoparticles” Bridging experiment and theory, Stockholm, 2014.

Editorial Positions

1989-94	Guest Editor *'Catalysis Today'* (Elsevier)
1994-present	Member of the Editorial Board *'Catalysis Today'* (Elsevier)
1990-97	Correspondent, Newsbrief section, *'Applied Catalysis' A* (Elsevier)
1994-present	Correspondent, Newsbrief section, *'Applied Catalysis' B* (Elsevier)
1994-present	Member of the Editorial Board *'Catalysis Letters'* (Baltzer)
1994-present	Member of the Editorial Board *'Topics in Catalysis '* (Baltzer)
1996-present	Editor in Chief *‘Catalytic Science’* (Imperial Press).
1997-2003	Member of the Editorial Board ‘*Applied Catalysis A’* (Elsevier).
1997-present	Editor, ‘*Applied Catalysis Newsbrief*’ (Elsevier)
1997-2000	Member of Editorial Board, ‘*New Journal of Chemistry*’ (RSC)
1997-2004	Associate Editor ‘*Journal of Catalysis*’ (Elsevier)
2005-present	Editor ‘*Journal of Catalysis*’ (Elsevier)
2007-present	Member of Editorial Board ‘*Advances in Catalysis*’
2007-present	Member of Editorial Board ‘*Gold Bulletin*’
2009-present	Member of the Editorial Board ‘*Green Chemistry*’
2010-present	Member of the Editorial Board of ‘*Catalysis Science and Technology’*
2012-present	Member of the Editorial Board of ‘*Proceedings of the Royal Society A*’
2013- present	Member of the Editorial Board of ‘*Scientific Reports’*

Guest periods at Research Institutes and visiting appointments at Universities

1987-90	Visiting Professor, University of Witwatersrand
1990-93	Visiting Research Associate, University of Witwatersrand
1992-93	Visiting Scientist, Institute de Recherches sur la Catalyse, CNRS, Villeurbanne France

2002-present Visiting Professor, University of Witwatersrand, Johannesburg, South Africa

2003-04 Professor in Residence at the Université Pierre et Marie Curie, Paris.

2010-present Visiting Professor Tokyo Metropolitan University, Japan.

2010-present Adjunt Professor State University of Louisiana.

Appointments to Councils of International Organisations

UK representative for the Council of the International Association of Catalysis Societies (2000-05)

Treasurer & Executive Member of the Council of the International Association of Catalysis Societies (2000-08)

Elected EFCATS UK representative (2001-03)

Appointed to RD & T Team (2001-05) and Strategic Advisory Board (2005-07), CRYSTAL Faraday, UK.

Appointed to Strategy and Technology Advisory Board on Sustainability for the Chemistry Innovation Knowledge Transfer Network (2007-present)

Council Member, Faraday Division Council, RSC (2008-present)

President elect Faraday Division, RSC (2011-12)

President Faraday Division, RSC (2012-2115)

Chair SCORE (2010-2013)

Director UK Catalysis Hub (2013-2015)

Research Funding Summary in last ten years

Total funding

Over 130 grants totalling over £30M in the last 10 years

Current and recent Funding

UK EPSRC Low temperature oxidation of methane in confined spaces £280801

UK EPSRC Development of high activity catalysts aided by microreaction technology £353098

UK EPSRC New green hydrogen peroxide production £119897

UK EPSRC Collaboration research in energy with South Africa: Upgrading of light alkanes to fuels £388231

UK EPSRC Novel nanorod oxidation catalysts £156810

British Council UKIERI - Design & development of nano vanadium phosphate as oxidation catalysts £61925

Exxon Mobil (USA) Catalytic Oxidative Cracking of Polynuclear Aromatics £390618

Invista (USA) Oxidation catalysis £225000

Johnson Matthey (UK) Acetylene hydrochlorination using supported gold catalysts £25000

Henkel AG & Co, (UK) Gold-based catalysts for bleaching application £62864

Sabic (Saudi Arabia) Synthesis gas conversion £481502

Sasol (South Africa) Hydrocarbon oxidation and Glycerol challenge £263200

Seldon Research Ltd (UK SME) Stability of OH radicals £71500

Solvay (Belgium) Direct synthesis of hydrogen peroxide £333829

UK Government TSB The glycerol challenge £611800 (involving Sasol, Tennants, Vertullus, Scionix)

UK Government TSB Nanomaterials for clean fuels £418916 (involving Johnson Matthey)

UK Government TSB Greywater £510010 (involving Wates, Johnson Matthey)

EU ERC Advanced Grant “After the Gold Rush” £1.9M

EPSRC “UK Catalysis Hub” £3.1M.

EPSRC “CDT in Catalysis” £4.4M.

EPSRC “Equipment for CDT in Catalysis” £498k.

Exxon Mobil “Methane Oxidation” £180k

Invista (USA) “Novel oxidation catalysts” £250k

Evonik (Germany) “Hydrocarbon Oxidation” £128k

Henkel (Germany) “Low temperature oxidation of molecules” £157290

UBE (Japan) “Designing catalysts for in situ synthesis” £39.5k

KTP (UK Government with Selden Research Limited) “To develop a residue free high level disinfectant using catalyst technology” £151491.

EU Framework 7 “NOVACAM” (Novel cheap and Abundant Materials for catalytic biomass conversion) £421276.