

## Professor Richard E Palmer MA PhD CPhys FInstP

Professor of Experimental Physics  
Head, Nanoscale Physics Research Laboratory

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### About

Richard established the Nanoscale Physics Research Lab (NPRL) in 1994 as the first centre for nanoscience in England. His research interests lie in atomic manipulation, atomic clusters, nanofabrication, biochips, catalysis, clean energy, novel instrument development.

He has published over 300 research papers and 20 patent applications and given more than 200 invited talks, while his work has featured in over 100 media articles and programs.

His work has also led to the creation of four high tech spin-off companies.

### Qualifications

- Honorary Doctoral Degree awarded by Hasselt University, Belgium, 2010
- Fellowship of the Institute of Physics, 1996
- MA and PhD, Cavendish Laboratory, Cambridge, awarded 1987
- BA (1st Class), Trinity Hall, Cambridge, 1983

### Biography

Richard Palmer obtained his first degree (1983) and PhD (1987) at Cambridge University, where he subsequently held 1851 (1986-1988), Clare College (1987-1994) and Royal Society Research Fellowships (1988-1994). In this period his research was mainly focused on surface physics, notably the resonance states of molecules on surfaces. Richard's interest in nanotechnology began in the early 1990's and found full opportunity for expression upon his appointment as Professor of Experimental Physics at Birmingham in 1994 at the age of 32 and the formation of the Nanoscale Physics Research Lab.

Richard has held visiting positions at Cornell, Oxford and Harvard Universities and the Technical University of Denmark. He has been elected to Honorary Professorships at the University of Wales, Swansea, Harbin Institute of Technology, China and the Petronas University of Technology, Malaysia. He received the 1996 Charles Vernon Boys Medal and Prize of the Institute of Physics, gave the Mott Prize Lecture in 1997 and the IoP Ireland Lectures in 2006 and was founding Chair of the Institute's Nanoscale Physics and Technology group. He was awarded an Honorary Doctoral Degree by Hasselt University, Belgium in 2010.

The four spin-off companies arising from Richard's research since 2005 are Inanovate (biochips), Interface Spectra Limited (SPELS), Birmingham Instruments (cluster beams) and Irresistible Materials (molecular resists). He also played a central role in the formation of Materials Solutions (nanomaterials). The formation of these companies fulfils a longstanding desire to translate new discoveries into technology and to contribute to the regeneration of the Midlands.

### Teaching

#### Teaching Programmes

- Physics with Nanoscale Physics (Program Co-ordinator)
- PSIBS (Doctoral Training Centre), lectures, projects
- Science communication and the media
- Summer research projects

### Postgraduate supervision

Richard himself usually recruits two or three PhD students each year. His own, multi-national research group typically consists of between eight and ten PhD students together with a set of post-doctoral Research Fellows, making 12-15 researchers in total. Most PhD candidates make informal contact by email in the first instance. Research projects are devised which match the expertise and interests of outstanding candidates to the research topics (see below) which are supervised by REP and funded by appropriate grants or sponsors.

### Research

#### Research Themes

Nanoscience and nanotechnology.

#### Research Activity

On arriving in Birmingham, Richard established a number of research programs, in atomic manipulation, atomic clusters and nanofabrication, underpinned by the development of novel scientific instruments, which - together with their applications in biochips, catalysis and clean energy - represent his principal research interests today.

The research programs he established in self-assembly, ultrafast (femtosecond) dynamics and UHV scanning electron microscopy are now led by fellow staff members in the NPRL (Dr's Guo, Kaplan and Theis, respectively). The atomic clusters research has also led to a program on aberration-corrected electron microscopy jointly run by Dr Ziyu Li.

More specific details of this research can be found on the [Nanoscale Physics Research Laboratory pages. \(http://npri.bham.ac.uk/Research/index.php\)](http://npri.bham.ac.uk/Research/index.php)

## Other activities

### Editorial Boards (Current)

- Editorial Board, ACS Nano (American Chemical Society), 2009
- Editorial Board, International Journal of Computational Materials Science and Surface Engineering (Inderscience), 2009
- Editorial Board, Nano Research (Springer), 2008
- Editorial Board, Chemical Engineering Science (Elsevier), 2007
- Editorial Board, International Journal of Nanomanufacturing (Inderscience), 2005
- Series Editor, Elsevier Series on Frontiers of Nanoscience, 2004
- Editorial Board, Small (Wiley-VCH), 2004
- Editorial Board, Journal of Nanoscience and Nanotechnology (ASP), 2001

### Advisory Boards (Current)

- International Advisory Board, Nanoscience Centre, University of Jyvaskyla, Finland, 2007
- International Committee on Nanostructured Materials (Secretary), 2003

### Conferences

- 2014 Chair, Cluster-Surface Interactions (CSI 2014), UK
- 2012 Chair, 13th International Workshop on Desorption Induced by Electronic Transitions (DIET XIII), UK
- 2011 Co-Chair, Gordon Conference on Clusters, Nanocrystals and Nanostructures, USA

## Publications

### Selected Publications

10. A new mechanism of atomic manipulation: Bond-selective molecular dissociation via thermally activated electron attachment, S. Sakulsermsuk, P.A. Sloan and R.E. Palmer, ACS Nano 4 7344-7348 (2010). See also "Physisorbed molecules take the heat", In Nano, ACS Nano 4 7040 (2010).
9. Nonlocal desorption of chlorobenzene molecules from the Si(111)-7x7 surface by charge injection from the tip of a scanning tunneling microscope: Remote control of atomic manipulation, P.A. Sloan, S. Sakulsermsuk and R.E. Palmer, Phys. Rev. Lett. 105 048301 (2010). See also "Electron 'submarines' help push atoms around", E.S. Reich, New Scientist, 31 July 2010, p. 11.
8. Acoustic plasmon of the Au(111) surface, S.J. Park and R.E. Palmer, Phys. Rev. Lett. 105 016801 (2010).
7. Counting the atoms in supported, monolayer-protected gold clusters, Z.W. Wang, O. Toikkanen, F. Yin, Z.Y. Li, B.M. Quinn and R.E. Palmer, JACS (Communications) 132 2854 (2010).
6. Bright beaches STM-Induced Charge Re-immigration inof nanoscale potassium islands on graphite in STM imaging, F. Yin, J. Akola, P. Koskinen, M. Manninen and R. E. Palmer, Phys. Rev. Lett. 102 106102 (2009).
5. Weighing supported nanoparticles: size-selected clusters as mass standards in nanometrology, N.P. Young, Z.Y. Li, Y. Chen, S. Palomba, M. Di Vece and R.E. Palmer, Phys. Rev. Lett. 101 246103 (2008). See also "Nanoparticles: Gold standard", Research Highlights, Nature Nanotechnology 4 76 (2009).
4. High-resolution detection of Au catalyst atoms in Si nanowires, J.E. Allen, E.R. Hemesath, D.E. Perea, J.L. Lensch-Falk, Z.Y. Li, F. Yin, M.H. Gass, P. Wang, A.L. Bleloch, R.E. Palmer and L. Lauhon, Nature Nanotechnology 3 168-173 (2008).
3. Three-dimensional atomic-scale structure of size-selected gold nanoclusters, Z.Y. Li, N.P. Young, M. Di Vece, R.E. Palmer, A.L. Bleloch, B.C. Curley, R.L. Johnston, J. Jiang, J. Yuan, Nature 451 46-48 (2008).
2. Two-electron dissociation of single molecules by atomic manipulation at room temperature, P.A. Sloan and R.E. Palmer, Nature 434 367 (2005).
1. Nanostructured surfaces from size-selected clusters, R.E. Palmer, S. Pratontep and H.G. Boyen, Nature Materials 2 443 (2003).