

Prof. Phillip John
Professor Emeritus
School of Engineering & Physical Sciences
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Prizes

Digital Business Awards 2009

John, P. (Recipient), 2009

Order of the British Empire

John, P. (Recipient), 2018

Research interests

Research

Phillip John OBE BSc PhD DSc, Professor Emeritus at Heriot-Watt University, has published over 200 peer reviewed publications, patents, book chapters and reviews, managed over fifty grants from Research Council, Government and industry sources, supervised 31 PhD and research MSc students (27 PhDs), given numerous invited lectures at national and international conferences. Member of the Engineering & Physical Sciences Research Council (EPSRC) College and EU Rapporteur and expert reviewer for the Horizon Europe research programme. The research achievements underpin the science of advanced materials. As an early career researcher, he was invited to present the Irvine Review Lecture (1982) at the University of St Andrews and, on two occasions, the Ames Lectures (1983, 1990) at the University of Edinburgh. He was honored by two National Research Council of Canada (NRC) Distinguished Visiting Scientist awards in the 1980s collaborating with Peter Hackett FRSC, former Vice President of NRC, in the area of laser chemistry. Following a commissioned paper (1989) to The Cabinet Office, he chaired the UK Science & Engineering Research Council (SERC) Town meeting on laboratory grown diamond developing the Council strategy in this area and obtained the first UK Research Council grant on the microwave plasma growth of diamond. He was appointed to the International Programme Committee (1995) and, ultimately in 1997, the Organising Committee (4 international scientists) of the pre-eminent International Diamond Conference in 1997. Phillip has served on the Management Board of the £2.4m EPSRC initiative 'Carbon Based Electronics: A National Consortium'. An EPSRC grant (2007) worth £1.4m was awarded for next generation materials for plasma fusion in collaboration with (the late) Professor Marshall Stoneham FRS at UCL. Phillip continues to collaborate with the Korea Institute of Science and Technology and has jointly published 15 papers and been granted five joint patents on diamond and graphene; a 2008 paper (Journal of Chemical Physics) on templating graphene on (111) diamond planes has been highly cited (>250 in Google Scholar).

Research interests include thermal, laser and plasma chemical vapour deposition (CVD) and applications of silicon and diamond.

Graphene and carbon nanotubes.

Educational Technology.

Administration

Phillip was elected as Dean of Science & Engineering for October 2007 to March 2013 and subsequently appointed as Senior Dean of the University until the 30th July 2015. Phillip was Chair of several global University committees including the Quality & Standards Committee, Postgraduate Studies Committee, Discipline Committee and a longstanding member of the Ordinances & Regulations Joint Committee of Senate and Court.

As Dean of Science and Engineering and Senior Dean of the University he has contributed to the establishment of campuses in Dubai and Malaysia and through his role as Chair of the Postgraduate Studies Committee and the University Quality and Standards Committee he has taken a pivotal role in assuring global academic standards.

Teaching Interests

A range of courses in Physical Chemistry and the Chemistry of Materials has been taught in the Department of Chemistry covering all years (SCQF 7-10) in the BSc and MChem Degrees in Chemistry. All the modules were delivered digitally with full use of a virtual learning environment (VLE) and formative e-assessment within the ethos of active learning. The modules were all highly rated by student evaluations.

The Department of Chemistry has been placed within the top 5 UK Chemistry Department within the National Student Survey (NSS) for 5 years (2011 to 2016 inc.) and within the top 3 for Departments which were also submitted to the UK-wide research quality exercises RAE/REF.

Phillip enjoyed visiting secondary schools across Scotland talking to students and staff about the fantastic variety of carbon allotropes and the recent research on growing diamond in the laboratory. Startling experiments on burning diamond and growing a 'diamond' in a microwave oven were taken to lectures at the Edinburgh International Science Festival ... an important science outreach event for the general public.

Apart from his teaching, research and administrative duties he has been the Head of the Academic Development team for SCHOLAR since its inception in 1999 and, from 2003, been Executive Chair of the SCHOLAR Forum; a partnership between The Directors of Education in Scotland and Heriot-Watt University. SCHOLAR (www.scholar.hw.ac.uk) providing innovative web-based courses to all 32 Education Authorities (~ 400 schools), five within the College sector and 33 independent schools in Scotland. SCHOLAR provides 37 complete Scottish Qualification Authority National 5, Higher and Advanced Higher STEM, Languages and Business subjects to over 130,000 student registrations and 10,000 teachers. SCHOLAR is continuing to attract international attention as one of the world's largest e-learning programmes for schools. SCHOLAR represented Scottish education at the 31st G8 Summit held on the 6-8th July 2005 at the Gleneagles Hotel in Auchterarder and hosted by Prime Minister Tony Blair. Represented Scottish education at the 15th Commonwealth Education Minister's Conference, October 2003, Edinburgh. Phillip has been the Vice-Chair and Chair, and a founding Board member, of the UK e-Assessment Association comprising the main awarding bodies and leading educational technology companies. SCHOLAR partnered with the Australian Council of Educational Research (ACER) to win the tender, in 2016, for the Scottish National Standardised Assessments. The role of SCHOLAR was to provide a professional learning for teachers in Scotland; the national training programme has been extremely well received by teachers and authorities alike. Following retirement from Heriot-Watt in December 2018 Phillip took up a post as Senior Consultant to the Australian Council for Educational Research and was awarded an Honorary Professorship at the University of Edinburgh. He is also a member of the Association of Directors of Education in Scotland (ADES). Phillip was awarded an OBE in the Queen's Birthday Honours in 2018 for 'services to education in Scotland'.

Research outputs

Deposition of polycrystalline and nanocrystalline diamond on graphite: effects of surface pre-treatments

Villalpando, I., John, P., Porro, S. & Wilson, J. I. B., Mar 2017, In: Applied Physics A: Materials Science and Processing. 123, 3, 183.

Growth of carbon fibres, sheets and tubes on diamond films under high power plasma etching conditions

Villalpando, I., John, P. & Wilson, J. I. B., 2017, In: Revista Mexicana de Fisica. 63, 2, p. 155-161 7 p.

The Nature of Metastable AA' Graphite: Low Dimensional Nano- and Single-Crystalline Forms

Lee, J. K., Kim, J.-G., Hembram, K. P. S. S., Kim, Y.-I., Min, B.-K., Park, Y., Lee, J. K., Moon, D. J., Lee, W., Lee, S. G. & John, P., 21 Dec 2016, In: Scientific Reports. 6, 39624.

Carbon fibre production during hydrogen plasma etching of diamond films

Villalpando de la Torre, I., John, P., Porro, S. & Wilson, J. I. B., 20 Jun 2016, In: RSC Advances. 6, 69, p. 64421-64427 7 p.

Structure of single-wall carbon nanotubes: A graphene helix

Lee, J. K., Lee, S., Kim, J. G., Min, B. K., Kim, Y. I., Lee, K. I., An, K. H. & John, P., 27 Aug 2014, In: Small. 10, 16, p. 3283-3290 8 p.

The seeded growth of graphene

Lee, J. K., Lee, S., Kim, Y. I., Kim, J. G., Min, B. K., Lee, K. I., Park, Y. & John, P., 14 Jul 2014, In: Scientific Reports. 4, 5682.

Structure of multi-wall carbon nanotubes: AA' stacked graphene helices

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Large Scale Blended Learning: An Evaluation of the SCHOLAR Programme

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Diamond coatings exposure to fusion-relevant plasma conditions

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Processing of 50 nm gate-length hydrogen terminated diamond FETs for high frequency and high power applications

Moran, D. A. J., MacLaren, D. A., Porro, S., McLelland, H., John, P. & Wilson, J. I. B., Aug 2011, In: Microelectronic Engineering. 88, 8, p. 2691-2693 3 p.

Hydrogen plasma etching of diamond films deposited on graphite

Villalpando, I., John, P., Porro, S. & Wilson, J. I. B., May 2011, In: *Diamond and Related Materials*. 20, 5-6, p. 711-716 6 p.

50nm gate-length hydrogen terminated diamond field effect transistors characterization and inspection of operation

Moran, D. A. J., MacLaren, D. A., Porro, S., Hill, R., McLelland, H., John, P. & Wilson, J., 2011, *Diamond Electronics and Bioelectronics - Fundamentals to Applications IV*. Cambridge University Press, p. 141-147 7 p. (Materials Research Society Symposium Proceedings; vol. 1282).

Hydrogen plasma interaction with (100) diamond surfaces

John, P. & Stoiku, M. D., 2011, In: *Physical Chemistry Chemical Physics*. 13, 24, p. 11503-11510 8 p.

Plasma enhanced CVD of materials for energy convertors: nano-silicon for solar cells and nano-diamond for fusion reactors

Wilson, J. I. B., Porro, S., John, P., Villalpando de la Torre, I. & Lind, H., 2011, In: *Romanian Journal of Physics*. 56, supplement, p. 15-22 8 p.

Crystalline diamond/graphite nanoflake hybrid films

Lee, J. K. & John, P., 1 Nov 2010, In: *Thin Solid Films*. 519, 2, p. 625-629 5 p.

Graphene-diamond hybrid material and method for preparing same using chemical vapor deposition

Lee, J. K. (Inventor), Lee, S. C. (Inventor), John, P. (Inventor), Lee, W. S. (Inventor) & Lee, J. K. (Inventor), 17 Aug 2010, Patent No. US 7,776.445 B2, 14 Aug 2008, Priority date 14 Aug 2007

Effects in CVD diamond exposed to fusion plasmas

Porro, S., De Temmerman, G., John, P., Lisgo, S., Villalpando, I. & Wilson, J. I. B., Aug 2010, In: *Physica Status Solidi (A) Applications and Materials Science*. 207, 8, p. 2004-

Surface analysis of CVD diamond exposed to fusion plasma

Porro, S., De Temmerman, G., MacLaren, D. A., Lisgo, S., Rudakov, D. L., Westerhout, J., Wiora, M., John, P., Villalpando, I. & Wilson, J. I. B., Jul 2010, In: *Diamond and Related Materials*. 19, 7-9, p. 818-823 6 p.

Characterisation and Inspection of 50nm Gate-Length Hydrogen Terminated Diamond Field Effect Transistors

Moran, D. A. J., MacLaren, D. A., Porro, S., Hill, R., McClelland, H., John, P. & Wilson, J. I. B., 2010.

Development and operation of 50nm gate length hydrogen terminated diamond field effect transistors

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Effects in CVD diamond exposed to fusion plasmas

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Nanocrystalline diamond coating of fusion plasma facing components

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Synthesis and characterization of freestanding diamond/carbon nanoflake hybrid films

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Unusual morphology of CVD diamond surfaces after RIE

Stoiku, M. D., John, P. & Wilson, J. I. B., Jul 2008, In: *Diamond and Related Materials*. 17, 7-10, p. 1164-1168 5 p.

The growth of AA graphite on (111) diamond

Lee, J. K., Lee, S. C., Ahn, J. P., Kim, S. C., Wilson, J. I. B. & John, P., 2008, In: *The Journal of Chemical Physics*. 129, 23, 234709.

Fabrication of spherical diamond microshells

Lee, J. K., Anderson, M. W., Gray, F. A. & John, P., Apr 2007, In: *Diamond and Related Materials*. 16, 4-7 SPEC. ISS., p. 701-704 4 p.

The fabrication of diamond microshells

John, P., Lee, J. K., Anderson, M., Gray, F. & Wilson, J., Dec 2006, In: *Chemical Vapor Deposition*. 12, 12, p. 714-717 4 p.

Explosive oxidation of HPHT diamond particles

Lee, J. K., Anderson, M. W., Gray, F. A. & John, P., Sept 2006, In: *Diamond and Related Materials*. 15, 9, p. 1206-1209 4 p.

The SCHOLAR Programme in Scotland

John, P., 2006, *Flexible delivery: an evaluation of the use of the virtual learning environment in higher education across Scotland*. Quality Assurance Agency for Higher Education, p. 33-44 12 p.

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Rabeau, J. R., John, P., Wilson, J. I. B. & Fan, Y., 1 Dec 2004, In: *Journal of Applied Physics*. 96, 11, p. 6724-6732 9 p.

Synthesis of diamond spheres

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Oxidation of CVD diamond powders

Lee, J. K., Anderson, M. W., Gray, F. A., John, P., Lee, J. Y., Baik, Y. J. & Eun, K. Y., Apr 2004, In: *Diamond and Related Materials*. 13, 4-8, p. 1070-1074 5 p.

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Bryce, M. R., Cooke, G., Duclairoir, F. M. A., John, P., Perepichka, D. F., Polwart, N., Rotello, V. M., Stoddart, J. F. & Tseng, H. R., 1 Sept 2003, In: *Journal of Materials Chemistry*. 13, 9, p. 2111-2117 7 p.

The oxidation of diamond: The geometry and stretching frequency of carbonyl on the (100) surface

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Nanocrystalline diamond films for nanotechnology applications

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Low temperature plasma chemical vapour deposition of carbon nanotubes

Wilson, J. I. B., Scheerbaum, N., Karim, S., Polwart, N., John, P., Fan, Y. & Fitzgerald, A. G., Mar 2002, In: Diamond and Related Materials. 11, 3-6, p. 918-921 4 p.

The cavity ring-down spectroscopy of C₂ in a microwave plasma

John, P., Rabeau, J. R. & Wilson, J. I. B., Mar 2002, In: Diamond and Related Materials. 11, 3-6, p. 608-611 4 p.

The oxidation of (100) textured diamond

John, P., Polwart, N., Troupe, C. E. & Wilson, J. I. B., Mar 2002, In: Diamond and Related Materials. 11, 3-6, p. 861-866 6 p.

The Cavity Ring-Down Spectroscopy in Microwave Plasmas

John, P. & Wilson, J. I. B., 2002, EPSRC. 8711 p.

Toward diamond lasers

John, P., 8 Jun 2001, In: Science. 292, 5523, p. 1847-1848 2 p.

Applied physics - Toward diamond lasers

John, P., 2001, In: SIRS Enduring Issues. Science. 292, p. 1847-1848 2 p.

High Resolution TEM Observation of CVD Diamond Films

Fitzgerald, A. G., Fan, Y.-C., Kisielowski, C., John, P., Troupe, C. E. & Wilson, J. I. B., 2001, *Electron microscopy and analysis 2001: proceedings of the Institute of Physics Electron Microscopy and Analysis Group Conference, University of Dundee, 5-7 September 2001*. Bristol: Institute of Physics, p. 39-42 4 p. (Institute of Physics conference series; no. 168).

Characterization of the surface morphology and electronic properties of microwave enhanced chemical vapor deposited diamond films

Fitzgerald, A. G., Fan, Y., John, P., Troupe, C. E. & Wilson, J. I. B., Nov 2000, In: Journal Vacuum Science and Technology B. 18, 6, p. 2714-2721 8 p.

Novel STM-based depth profiling technique for the electronic characterization of thin film materials

Fan, Y., Fitzgerald, A. G., Cairns, J. A., John, P., Troupe, C. E. & Wilson, J. I. B., 1 Aug 2000, In: Applied Surface Science. 162, p. 630-637 8 p.

Scanning Probe Microscopy and Spectroscopy of CVD Diamond Films

Fan, Y., Fitzgerald, A. G., John, P., Troupe, C. E. & Wilson, J. I. B., Apr 2000, In: Microchimica Acta. 132, 2-4, p. 435-441 7 p.

Study of the Interface Microstructures of CVD Diamond Films by TEM

Fitzgerald, A. G., Fan, Y., John, P., Troupe, C. E., Wilson, J. I. B., Tooke, A. O. & Storey, B. E., Apr 2000, In: Microchimica Acta. 132, 2-4, p. 315-321 7 p.

Dissociative Electron Attachment during the Laser Desorption of Anthracene Picrate

Hankin, S. M. & John, P., 1 Sept 1999, In: Journal of Physical Chemistry A. 103, 35, p. 6887-6890 4 p.

Microscopic cluster formation during the laser desorption of chrysene-d₁₂

Hankin, S. M. & John, P., 3 Jun 1999, In: Journal of Physical Chemistry B. 103, 22, p. 4566-4569 4 p.

Laser time-of-flight mass analysis of PAHs on single diesel particulates

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Jubber, M. G., McIlvanney, K., McLaughlin, A. J., Marsh, J. H., Aitchison, J. S., Troupe, C. E., John, P. & Wilson, J. I. B., 1998, p. 90. 1 p.

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The surface morphology and characterisation of electronic properties of boron implanted microwave plasma CVD diamond films by atomic force and scanning tunneling microscopies

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Laser Time-of-Flight Mass Spectrometry of PAH-Picrate Complexes

Hankin, S. M., John, P. & Smith, G. P., 1 Aug 1997, In: Analytical Chemistry. 69, 15, p. 2927-2930 4 p.

Is Interfacial Silicon Carbide Necessary for the Epitaxy of Diamond on (100) Silicon?

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The Heteroepitaxy of Diamond on (100) Silicon

John, P., 1997, p. 13-22. 10 p.

The Laser Mass Spectrometry of Anthracene Picrate

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Shallow angle x-ray diffraction from as-deposited diamond thin films

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