Harry Kroto (http://www.kroto.info) General info

(http://www.kroto.info/general-info/) Curriculum Vitae

Professor Sir Harold Kroto FRS

http://en.wikipedia.org/wiki/Harry_Kroto (http://en.wikipedia.org/wiki/Harry_Kroto)

https://en.wiki2.org/wiki/Harry_Kroto (https://en.wiki2.org/wiki/Harry_Kroto)

http://www.wikiwand.com/en/Harry_Kroto (http://www.wikiwand.com/en/Harry_Kroto)

Overview

In 1996 knighted for contributions to chemistry and later that year, together with Robert Curl and Richard Smalley (of Rice University, Houston, Texas), received the Nobel Prize for Chemistry for the discovery of C60 Buckminsterfullerene a new form of carbon. Fellow of the Royal Society (1990), Foreign Associate of the National Academy of Sciences (US), President of the Royal Society of Chemistry (2002-2004). Longstaff Medal of the Royal Society of Chemistry (1993), Faraday Lecturer 2001 (Royal Society), Copley Medal of the Royal Society (2002), Erasmus Medal of Academia Europaea, Freeman of the City of Torino, 29 Hon Degrees.

Chronology

1939

1947 – 58

Born: Wisbech, Cambridgeshire

Bolton School – Bolton Lancashire

1958 – 61

University of Sheffield – BSc (First class honours degree Chemistry)

1961 – 64

University of Sheffield – PhD (Molecular Spectroscopy, 1964)

1964 – 66

National Research Council (Ottawa, Canada) Postdoc

1966 – 67

Bell Telephone Laboratories (Murray Hill, NJ USA)

1967 – 04

University of Sussex (Brighton): Tutorial Fellow, Lecturer 1968, Reader 1977
Professor 1985-2005 – Royal Society Research Professor (1991-2001)

2004 –

Florida State University, Francis Eppes Professor of Chemistry

Research fields cover several major topics: (see also Main contributions (http://www.kroto.info/main-contributions/))

1961 – 1970

Electronic spectroscopy of free radicals and unstable intermediates in the gas phase, ii) Raman spectroscopy of intermolecular interactions in the liquid phase and iii) Theoretical studies of electronic properties ground and excited states of small molecules and free radicals.

1970 – 1980

Research focused on the creation of new molecules with multiple bonds between carbon and elements, mainly of the second and third row of the Periodic Table (S, Se and P), which were reluctant to form such a link. These studies showed that many of these previously assumed impossible species could be produced, studied by spectroscopy and used as valuable synthons leading to a wide class of new phosphorus containing compounds. In particular the spectroscopic studies of molecules with carbon-phosphorus multiple bonds (C=P and C?P) were the pioneering studies that initiated the now prolific field of Phosphaalkene/alkyne Chemistry.

1975 – 1980

Laboratory and radioastronomy studies on long linear carbon chain molecules (the cyanopolyynes) led to the surprising discovery (by radioastronomy) that they existed in interstellar space and also in stars. Since these first observations the carbon chains have become a major area of modern research by molecular spectroscopists and astronomers interested in the chemistry of space.

1985 – 1990

The revelation (1975-1980) that long chain molecules existed in space could not be explained by the then accepted ideas on interstellar chemistry and it was during attempts to rationalise their abundance that C60 Buckminsterfullerene was discovered. Laboratory experiments at Rice University, which simulated the chemical reactions in the atmospheres of red giant carbon stars, serendipitously revealed the fact that the C60 molecule could self-assemble. This ability to self-assemble has completely changed our perspective on the nanoscale behaviour of graphite in particular and sheet materials in general. The molecule was subsequently isolated independently at Sussex and structurally characterised.

1990 – 2004

Present research focuses on Fullerene chemistry and the nanoscale structure of new materials, in particular nanotubes. This has led to a wide range of new nanostructured materials the first insulated nanowires and new perspectives on the mechanism of nanotube formation.

2004 –

Research programme has been set up at Florida State aimed at: a) A deeper understanding of the range molecular constituents of carbon vapour; b) the development of novel 2D arrays and associated open framework systems of metal cluster/organic linkers as well as peptides; c) The of stabilization small fullerenes; d) Carbon nanotube based devices.

Key collaborations:

With D R M Walton (Sussex), T Oka, L Avery, N Broten and J MacLeod (NRC Ottawa) on carbon chain molecules in the laboratory and space; J F Nixon on phosphaalkene/alkyne chemistry (at Sussex); R Taylor and D R M Walton on Fullerene chemistry and nanostructures (at Sussex); with R F Curl, J R Heath, S C O'Brien, Y Liu and R E Smalley (at Rice University Texas) on the discovery of Buckminsterfullerene; Naresh Dalal (FSU), Tony Cheetham (UCSB/Cambridge) on new materials research, Alan Marshall (FSU) carbon vapour research.

Educational Initiatives:

Chairman of the board of the Vega Science Trust (www.vega.org.uk) which is produces science programmes for network television. 150 have been made 75 broadcast on the BBC. Member of National Advisory Committee on Cultural and Creative Education (UK). Global Educational Outreach for Science Engineering and Technology (GeoSet www.geoset.info). Director of the Florida Centre for Research in Science Technology and Maths Education (FCR-STEM)

Awards

Sunday Times Book Jacket Design Competition 1963 (http://www.kroto.info/sunday-times-bookjacket/) (http://www.kroto.info/wp-content/uploads/2015/05/sundaytimes1.jpg)

Tilden Lectureship of the RSC (1981); (http://www.kroto.info/research/molecular-spectroscopy/)

International Prize for New Materials by the American Physical Society (shared 1992 with Robert Curl and Richard Smalley);

Italgas Prize for Innovation in Chemistry (1992);

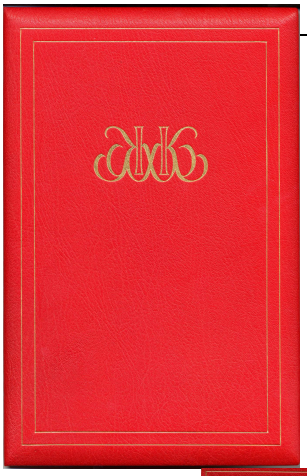
Royal Society of Chemistry Longstaff Medal (1993);

Hewlett Packard Europhysics Prize (shared with Wolfgang Kraetschmer, Don Huffman and Richard Smalley 1994);

Moet Hennessy Louis Vuitton LVMH. “Science pour l’Art” prize 1994.

Knighthood (January 1996)

Nobel Prize for Chemistry in October 1996 (shared with Robert Curl and Richard Smalley); (http://www.kroto.info/image-bank/nobel-prize/)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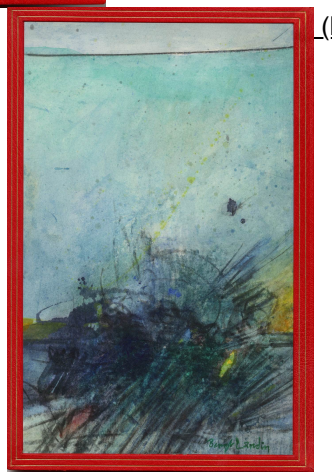
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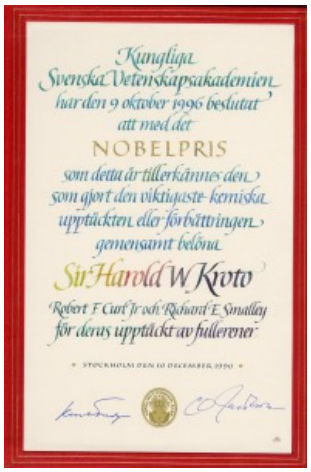
Kungliga
Svenska Vetenskapsakademien
har den 9 oktober 1996 beslutat
att med det
NOBELPRIS
som detta år tillerkännes den
som gjort den viktigaste kemiska
upptäckten eller förbättringen
gemensamt belöna
Sir Harold W Kroto
Robert F Curl Jr och Richard E Smalley
för deras upptäckt av fullerener
(http://www.kroto.info/wp-content/uploads/2014/09/Nobel-Citation.jpg)

American Carbon Society Medal for Achievement in Carbon Science (shared with Robert Curl and Richard Smalley1997);

Blackett Lecturship 1999 (Royal Society);

Faraday Award and Lecture 2001 (Royal Society). (http://www.kroto.info/recorded-presentations/)

Dalton Medal 1998 (Manchester Lit and Phil),

Erasmus Medal of Academia Europaea,

Ioannes Marcus Marci Medal 2000 for spectroscopy (Prague),

Copley Medal of the Royal Society (2002),

Order of Cherubini (Torino 2005),

Kavli Lecturer (2008)

Societies:

Fellow of the Royal Society (1990),

Fellow of the Royal Society of Chemistry;

President of the Royal Society of Chemistry (2002-2004),

Mexican Academy of Science; Member Academia Europaea (1993);

Hon. Foreign Member Korean Academy of Science and Technology (1997);

Hon. Fellow of the Royal Microscopical Society (1998);

Hon. Fellow of the Royal Society of Edinburgh (1998);

Hon Fellow of the RSC (2000),

Foreign Member Finnish Academy of Sciences,

Academy of Sciences (Torino 2005),

Foreign Associate of the National Academy of Sciences (US 2007)

Miscellania

http://cs.astronomy.com/asy/b/daves-universe/archive/2015/05/20/sir-harold-kroto-and-david-eicher-join-starmus-festival-board.aspx (http://cs.astronomy.com/asy/b/daves-universe/archive/2015/05/20/sir-harold-kroto-and-david-eicher-join-starmus-festival-board.aspx)

Honorary degrees:

1. Université Libre de Bruxelles (Belgium)
2. University of Stockholm (Sweden)
3. University of Limburg (Belgium)
4. University of Sheffield (UK)
5. University of Kingston (UK)
6. University of Sussex (UK)
7. University of Helsinki (Finland)
8. University of Nottingham (UK)
9. Yokohama City University (Japan)
10. University of Sheffield-Hallam (UK)
11. University of Aberdeen (Scotland)
12. University of Leicester (UK)
13. University of Aveiro (Portugal)
14. University of Bielefeld (Germany)
15. University of Hull (UK)
16. Manchester Metropolitan University (UK)
17. Hong Kong City University (HK China)
18. Gustavus Adolphus College (Minnesota, US)
19. University College London (UK)
20. University of Patras (Greece)

21. University of Dalhousie (Halifax, NovaScotia, Canada)
22. University of Strathclyde (Scotland)
23. University of Manchester (UK)
24. Kraków Mining University (Poland)
25. University of Durham (UK)
26. Queens University Belfast (NI)
27. University of Surrey (UK)
28. Polytechnico di Torino (Italy)
29. University of Chemical Technology – Beijing (China)
30. University of Liverpool (UK)
31. Florida Southern College (US)
32. Keio University (Japan)
    080709e KEIO U (http://www.kroto.info/wp-content/uploads/2014/09/080709e-KEIO-U.pdf)
33. University of Chiba (Japan)
34. University of Bolton (UK)
35. University of Hartford (US)
36. University of Tel Aviv (Israel)
37. University of Poitiers (France)
38. Universidad Complutense de Madrid
39. Naresuan University (Thailand)
40. Vietnam National University (Hanoi)
41. Edinburgh University (UK) (http://www.chem.ed.ac.uk/about-us/tercentenary/tercentenary-events/tercentenary-graduation-ceremony/professor-sir-harold)
42. University of Primorska (Slovenia)

Honorary degrees returned due to closure of Chemistry Courses

1. Hertfordshire University[46] (http://en.wikipedia.org/wiki/Harry_Kroto#cite_note-46)
2. Exeter University[47] (http://en.wikipedia.org/wiki/Harry_Kroto#cite_note-47)

Graphic Design:

Graphic design work has resulted in numerous posters, letterheads, logos, book/journal covers, medal design etc. Awards: Sunday Times Book Jacket Design competition (1964) and more recently the Moet Hennessy/Louis Vuitton Science pour l'Art Prize (1994). Citation in the international design annual "Modern Publicity" (1979) for the cover of "Chemistry at Sussex". Design of Nobel UK Stamp for Chemistry 2001. Exhibit 2004 Royal Academy (London) Summer Exhibition

Education Awards:

Prix Leonardo Bronze Medal (2001); Chemical Industries Association (Presidents prize short list 1998 and 1999)

Main research areas:

I. Spectroscopy of Unstable Species and Reaction Intermediates (Infrared, Photoelectron, Microwave and Mass Spectrometry)
II. Astrophysics (Interstellar Molecules and Circumstellar Dust)
III. Cluster Science (Carbon and Metal Clusters, Microparticles, Nanofibres)
IV. Fullerene Chemistry, Nanoscience and Nanotechnology

Research Highlights (Ref Nos – Key Refs List)

a. First detection of 1Δ state of a polyatomic free radical (NCN by flash photolysis) [3,4]
b. Theoretical studies of ground and electronically excited sates of small molecules [5,6]
c. Detection of liquid phase intermolecular interactions using Raman Spectroscopy [7-10]
d. Breakthrough in the detection of new unstable species (thioaldehydes, thiocarbonyls thioborines) using combination of microwave and photoelectron spectroscopy techniques [12,15,18-22,31,80]
e. Synthesis in 1976 of the first phoaphaalkenes (compounds containing the free carbon phosphorus double bond) in particular CH2=PH (with N P C Simmons and J F Nixon, Sussex), [28, 80]
f. Monograph “Molecular Rotation Spectra” [23]
g. Synthesis in 1976 of the first analogues of HCP, the phosphaalkynes which contain the carbon phoshorus triple bond – in particular CH3CP (with N P C Simmons and J F Nixon, Sussex), [29,80]
h. The discovery (1976-8) of the cyanopolyynes, HCnN (n=5,7,9), in interstellar space (with D R M Walton A J Alexander and C Kirby (Sussex) and T Oka, L W Avery, N W Broten and J M MacLeod (NRC Ottawa)), Ref 4-6, based on microwave measurements made at Sussex, [27,30,35,80]
i. The discovery of C60: Buckminsterfullerene in 1985 (with J R Heath, S C O’Brien, R F Curl and R E Smalley), [100,112,139,239]
j. The detection of endohedral metallofullerene complexes (with J R Heath, S C O’Brien, Q Zhang, Y Liu, R F Curl, F K Tittel and R E Smalley), [101,139]
k. The prediction that C60 should be produced in combustion processes and might indicate how soot is formed (with Q L Zhang, S C O’Brien, J R Heath, Y Liu, R F Curl and R E Smalley) [103,139]
l. The explanation of why C70 is the second stable fullerene (after C60) and the discovery of the Pentagon Isolation Rule as a criterion for fullerene stability in general [107,112,139,239]
m. The prediction of the tetrahedral structure of C28 and the possible stability of “tetravalent” derivatives such as C28H4 [107,112,139,239]
n. In 987 the first prediction that C60 and its analogues such as C60+, endohedral species M@C60 and complexes M.C60 will survive in space and are the best candidates for carriers of the Diffuse Interstellar Bands DIBs (http://www.kroto.info/introduction-to-interstellar-molecules-early-observations-sources-dibs-etc/)
o. The prediction that giant fullerenes have quasi-icosahedral shapes and the detailed structure of concentric shell graphite microparticles (with K G McKay), [111,112,139,239]
p. The mass spectrometric identification and solvent extraction (with J P Hare and A Abdul-Sada) of C60 from arc processed carbon in 1990 – independently from and simultaneously with the Heidelberg/Tucson group; Refs [121,239]
q. The chromatographic separation/purification of C60 and C70 and 13C NMR measurements which provided unequivocal proof that these species had fullerene cage structures (with J P Hare and R Taylor, Sussex), Refs [121,139,239]
r. Crystal structure of C60 [135,138]
s. Main Fullerene chemistry breakthroughs: C60(ferrocene)2 [162], characterisation of C60Hal6 [174,149], C60(P4)2 [187], [192]
t. Nanoscience and Nanotechnology advances: Condensed phase nanotubes [205], nanoscale BN structures [224], partly aligned-nanotube bundles [233], nanotube formation mechanisms [161,238], silicon oxide nanostructures [247], Si surface-deposited fullererene studies [251], insulated carbon nanotube conductors [297]

NB General review refs underlined