

UCLA's Fraser Stoddart adds Knight Bachelor to his List of Honors

December 30, 2006 – UCLA professor Fraser Stoddart, director of the California NanoSystems Institute (CNSI), who holds UCLA's Fred Kavli Chair in NanoSystems Sciences, has been appointed by Her Majesty Queen Elizabeth II as Knight Bachelor for Services to Chemistry and Molecular Nanotechnology.

In addition to the personalities such as Paul McCartney and Sean Connery from the field of popular culture who have been honored with the title of knight bachelor, Stoddart joins a formidable list of eminent scientists, including Alexander Fleming, Francis Crick, and Harold Kroto, respectively the discoverers of penicillin, the DNA double helix, and C-60. Stoddart is the first UCLA professor to receive the honor.

Stoddart says that when he broke the news about his award – which came like a bolt out of the blue – to his two daughters, Fiona and Alison, their response was, “That’s really cool, Dad.” Stoddart adds that, “This special honour is a reflection, not only of my own achievements, but also the considerable support that I have received from my academic colleagues, my students and, above all, my late wife Norma. It also recognizes the significance and relevance of chemistry to everyday life and the international standing of CNSI at the beginning of 2007.”

Over the period January 1996 to August 2006, Stoddart is ranked by Thomson Scientific as the world’s third most cited researcher in chemistry. He has published more than 770 communications, papers and reviews, and delivered more than 700 invited lectures around the world. His former graduate students and postdoctoral fellows, inspired by his imagination and creativity, now occupy senior positions in universities, government laboratories and industries throughout North and South America, Europe, the Middle East, India, Japan, Korea, Taiwan and Australia.

He is one of the few chemists to have created a new field of chemistry over the past quarter of a century by introducing an additional bond, the mechanical bond, into chemical compounds. He has pioneered the development of the use of molecular recognition and self-assembly to make mechanically interlocked compounds called catenanes (two or more rings interlocked as in the links of a chain) and rotaxanes (a dumbbell-shaped component with at least one ring threaded in a manner reminiscent of an abacus).

Although, in the first generation of these exotic molecular compounds, the components which move relatively between two states were indistinguishable, in the second generation, bistability was introduced; resulting in the making of the world's tiniest ON/OFF (molecular) switches of around a cubic nanometer in volume. Subsequently, these molecular switches have been incorporated, at high densities, into molecular random access memory (RAM) circuits.

The scope of Stoddart's research has broadened over the years under the umbrella of activities he calls "Molecular Meccano" as a result of his introducing the two-state molecular switches into devices where actuation becomes the key to their operation. He has, for example, designed and made nanovalves which consist of moving parts in the form of many switchable rotaxane molecules attached to a tiny sphere of porous glass about 500 nanometers in diameter. The channels in the porous glass are long but only a few nanometers in diameter, just big enough to allow small molecules to enter. These nanovalves, which are very much smaller than living cells, are capable of crossing cell membranes and are now being adapted to be used as highly targeted drug-delivery systems towards, for example, cancerous cells, as well as to harvest the contents of such cells, after the fashion of a lunar landing vehicle collecting samples of dust from the surface of the moon.

Stoddart came to UCLA to occupy the Saul Winstein Chair in Chemistry in 1997 from England's University of Birmingham, where he had been professor of organic chemistry from 1990 and had headed up the university's School of Chemistry since 1993. In 2005, he received the honorary degree of doctor of science from Birmingham and also, just recently in early December, from the University of Twente in The Netherlands.

Born in Edinburgh, Scotland, in 1942, Stoddart received his bachelor of science (1964) and Ph.D. (1966) degrees from the University of Edinburgh, where he worked with British chemist Sir Edmund Hirst. In 1967, he moved to Queen's University in Ontario, Canada, as a National Research Council postdoctoral fellow and then, in 1970, to the University of Sheffield as an Imperial Chemical Industries (ICI) research fellow before joining the faculty as lecturer (assistant professor) in chemistry. He was a Science Research Council senior visiting fellow at UCLA in 1978. After spending a three-year "secondment" (1978-81) at the ICI Corporate Laboratory in Runcorn, England, he returned full-time to the

University of Sheffield where he was promoted to a readership (associate professorship). He moved to the University of Birmingham in 1990.

He was awarded a doctorate of science by Edinburgh in 1980 for his research into chemistry beyond the molecule. He was also the recipient this year of the University of Edinburgh Alumnus of the Year 2005 Award. The award is presented annually to a former student of Edinburgh University for services to the community, or for achievements in the arts or sciences, or for their contributions to business, public or academic life. Previous winners include the British politician Lord Steel of Aikwood, the novelist Ian Rankin, and double Olympic Medalist Katherine Grainger.

Stoddart is a fellow of the Royal Society (1994), the German Academy of Natural Sciences (1999), the American Association for the Advancement of Science (2005) and the Science Division of the Royal Netherlands Academy of Arts and Sciences (2006). He serves on the international advisory boards of numerous journals, including the Journal of Organic Chemistry, *Angewandte Chemie*, and *Chemistry, A European Journal*.

The CNSI, a joint enterprise between UCLA and the University of California, Santa Barbara (UCSB), is exploring the power and potential of organizing and manipulating matter to engineer “new integrated and emergent systems and devices, by starting down at the nanoscale level, that will aid and abet information technology, energy production, storage and saving, environmental well-being and diagnosis, prevention and treatment of chronic and degenerative diseases with an impact that far outstretches our comprehension of life to date,” Stoddart reflected. He added that “the institute’s demonstrated ability to attract stellar faculty and awesome students has the potential to lead to the generation of a cadre of scientists, engineers, and artists, who will bring prosperity and enlightenment to the State of California beyond anything that humankind has witnessed since the onset of civilization.”

When Stoddart was appointed director of the CNSI in 2003, he also assumed the Fred Kavli Chair of NanoSystems Sciences. Presently the Winstein Chair of Chemistry is in abeyance.

For more information about Stoddart’s research, please see <http://stoddart.chem.ucla.edu/>.

News editors and others are also referred to an interview with Science Watch in late 2005 – Cover Page: <http://www.sciencewatch.com/sept-oct2005/index.html>

Full Story: http://www.sciencewatch.com/sept-oct2005/sw_sept-oct2005_page3.htm

– and to an article entitled “From a Meccano Set to Nano Meccano” published in Pure & Applied Chemistry in 2005, Vol. 77, No. 7 pp.1089-1106. This article is available on request from Professor Stoddart.

Professor Stoddart will be available around the clock either at home [Int Code +1-310-453-9567] or in his office [Int Code+1-310-206-7078] for interview on Friday 29 December 2006, Saturday 30 December 2006, Sunday 31 December 2006 and on Monday 1 January 2007. Note that PST (Pacific Standard Time) in Los Angeles is 8 hours behind GMT in the UK.

About Knight Bachelor

A knighthood is one of the highest civil honours in the United Kingdom and it forms part of the British honours system. It recognizes distinguished contributions to national and international life and is conferred by The Queen, on advice from the Prime Minister’s Office.

At the conferment ceremony, which usually takes place at Buckingham Palace, the London residence of The Queen, the knight bachelor kneels before The Queen, who lightly touches the top of his shoulder with the ceremonial sword in a procedure known as ‘dubbing’. He then stands before The Queen, who hands him his insignia and engages in conversation.

Knights bachelor are the most ancient of the British knights, being traced back to the reign of King Henry III (1216–1272). Knighthoods carry the formal title ‘Sir’. Each year about 20 knighthoods are announced in The New Year Honours List and also in The Queen’s Birthday Honours List (in June).

About The Kavli Foundation

Dedicated to the advancement of science for the benefit of humanity, The Kavli Foundation supports scientific research, honors scientific achievement, and promotes public understanding of scientists and their work. It supports science of the greatest physical dimensions of space and time, the science of the smallest dimensions of systems of atoms and molecules, and the science to understand the human brain. This mission is

implemented through an international program of research institutes, prizes, professorships, and symposia in the fields of astrophysics, nanoscience and neuroscience.

About Nano

Nanosystems-related research is performed on a size-scale ranging from a nanometer – 10 to the minus 9 or one billionth of a meter – to a few hundred nanometers. C-60 is less than one nanometer in diameter. The DNA molecule is two nanometers wide, roughly 1,000 times smaller than a red blood cell and 10,000 times smaller than the diameter of a human hair.

About the CNSI

The CNSI was established in December 2000 through a State of California initiative to create four Institutes of Science and Innovation, one of them being the CNSI, and requiring them to forge partnerships with industry as a way to accelerate technological changes for society in general and advances for the peoples of California in particular. CNSI members represent an interdisciplinary collaboration among UCLA and UCSB faculty from the life and physical sciences, engineering and medicine. The CNSI at UCLA is planning to move into a brand new building early in 2007. The 180,000 square feet facility will house a 260-seat theater, wet and dry laboratories, fully outfitted conference rooms, and three floors of core facilities which will include equipment in the form of electron microscopes, atomic force microscopes, X-ray diffractometers, optical microscopies and spectroscopies, high throughput robotics and class 100 and 1000 clean rooms for projects led by CNSI and other faculty. In addition, the campus at UCLA is funding the CNSI to the tune of 15 jointly-hired faculty to ensure that the institute will have all of the expertise that is essential to making rapid progress in nanoscience and nanotechnology against fierce international competition.

For more about the CNSI, please see <http://www.cnsi.ucla.edu/>.

About UCLA

California's largest university, UCLA enrolls approximately 38,000 students per year and offers degrees from the UCLA College of Letters and Science and 11 professional schools in

dozens of varied disciplines. UCLA consistently ranks among the top five universities and colleges nationally in total research-and-development spending, receiving more than \$820 million a year in competitively awarded federal and state grants and contracts. For every \$1 state taxpayers invest in UCLA, the university generates almost \$9 in economic activity, resulting in an annual \$6 billion economic impact on the Greater Los Angeles region. The university's health care network treats 450,000 patients per year. UCLA employs more than 27,000 faculty and staff, has more than 350,000 living alumni and has been home to five Nobel Prize recipients.