

The Richard C. Lord Lecture is an annual event sponsored by the MIT Department of Chemistry and the G. R. Harrison Spectroscopy Laboratory to honor a scientist who has made important contributions to the field of spectroscopy. We thank the many friends and colleagues of Dr. Lord for their generous contributions to the endowment fund.

Past Awardees

Takeshi Oka 1992

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Richard Zare 1995

Carl Lineberger 1996

William Klemperer 1997

William Phillips 1998

Theodor Hänsch 1999

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Norman Ramsey 2002

Britton Chance 2003

Watt Webb 2004

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Graham Fleming 2007

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Stefan Hell 2011

Erich Ippen 2012

James Fujimoto 2013



Massachusetts Institute of Technology

The Department of Chemistry and  
MIT Laser Biomedical Research Center  
cordially invite you to attend the

## **2014 Richard C. Lord Lecture**

By

**Mostafa A. El-Sayed**

on

## **Plasmonic Nanotechnology Meets Biology in the Cancer Cell**

Tuesday, April 29, 2014, 12 Noon  
MIT, Grier Room (34-401)

Refreshments served following the lecture

**Plasmonic Nanotechnology Meets Biology in the Cancer Cell.** Using the plasmonic enhancement of Rayleigh scattering by silver or gold nanoparticles, we were able to image the behavior of communities of cancer cells as they are dying from increasing the concentration of the nanoparticles at their cell nuclei. In order to gain molecular information, we were able to record the time-dependent enhanced molecular Raman vibration spectra (SERS) of the molecules anywhere in the cell during the full cell cycle from birth to division or if we give the cells cancer drugs, we can determine the time of the cell death. The potential future uses of this new technique of “plasmonic enhanced molecular cell imaging (PEMCI)” in molecular cell biology and in medicine is pointed out.



**Mostafa El-Sayed**, BSc, Ain Shams University, Cairo, Egypt; PhD, Florida State University; Postdoctoral Fellow, Yale University, Harvard University, and California Institute of Technology; Faculty member at UCLA Department of Chemistry and Biochemistry (1961-94); Julius Brown Chair and Regents' Professor, Georgia Institute of Technology Department of Chemistry and Biochemistry (1994-present)

Professor El-Sayed has over 650 publications. He is a member of the US National Academy of Sciences (1980), a fellow of the American Academy of Arts and Sciences (1986), a

member of the Third World Academy of Sciences (1984), an Inaugural Fellow of the American Chemical Society and the American Physical Society, a fellow of the American Association for the Advancement of Sciences, and an honorary fellow of the Indian and the Chinese Chemical Societies.

He received the King Faisal International Prize in the Sciences (Chemistry), 1990, and honorary doctorates from the Colleges of Medicine of both Mansoura and Alexandria Universities in Egypt. He has received a number of US national awards such as the Fresenius, the Tolman, the Richards medal, the Lindeman medal, the Seaborg medal, and numerous other ACS section awards. In 2002, he received the ACS-APS Langmuir National Award in Chemical Physics and in 2007 was awarded Georgia Tech's distinguished Professor of the year. Professor El-Sayed received the 2007 US National Medal of Science in Chemistry and the Medal of the Egyptian Republic of the First Class in 2009.

**Richard C. Lord** was born in Louisville, Kentucky, in 1910. He graduated from Kenyon College, Ohio, in 1931. He received a PhD in physical chemistry from Johns Hopkins University in 1936, where he began a long and distinguished career as a scientist and educator. In 1942 Dr. Lord came to MIT. He was appointed Professor of Chemistry in 1954 and was Director of the Spectroscopy Laboratory from 1946 to 1976. He died in 1989.

Lord's research contributions were in the infrared and Raman spectroscopy of polyatomic molecules. His achievements include the observation and interpretation of Coriolis-activated forbidden vibrational transitions, the synthesis and complete vibrational analysis of a large number of deuterated molecules, and the discovery and exploitation of the anomalous far-infrared spectra of ring molecules. Toward the end of his career he became interested in biomolecules. His studies of the laser Raman spectra of proteins and nucleic acids opened a new field of research.

Lord was also a dedicated teacher and an inspired supervisor of graduate students. His summer course in spectroscopy, held first at MIT and then at Bowdoin College, attracted more than 2000 scientists.

Lord had a major impact on the development of the Spectroscopy Laboratory. During his thirty-year tenure as Director, the Laboratory became an Inter-departmental Laboratory of the School of Science, with broadened faculty participation. Research activities expanded from the study of atomic spectra using visible light and large gratings to include visible-UV electronic molecular spectra, to molecular vibrational spectra using classical infrared and far infrared sources, and then to the use of lasers. During this period the Laboratory pioneered in a wide variety of vibrational studies of molecules and Raman studies of biomolecules, some of them mentioned above, as well as in seminal laser studies of the stimulated Raman and Brillouin effects and the use of lasers for precision measurements and ultra-high resolution spectroscopy.

Lord received the Presidential Certificate of Merit in 1948 and the Award in Spectroscopy from the Pittsburgh Spectroscopy Society in 1966. He served as president of the Commission of Molecular Spectroscopy of the International Union of Pure and Applied Chemistry, and was president of the Optical Society of America, and received the Lippincott Medal from them in 1976. He was also a fellow of the American Academy of Arts and Sciences.

The annual Richard C. Lord Lecture has been established as a tribute to the memory of Dr. Lord.