



HONDA FOUNDATION

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PRESS RELEASE

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**UC Berkeley Chemist Dr. Gabor Somorjai to Receive Honda Prize 2011 for
His Pioneering Contributions to Surface Chemistry that
Established the Foundation of Today's Sophisticated Catalysis**

The Honda Foundation, a public-interest incorporated foundation created by Honda Motor's founder Soichiro Honda and his younger brother Benjiro Honda, and currently headed by Hiroto Ishida, is pleased to announce that the Honda Prize 2011 will be awarded to Dr. Gabor Somorjai, Professor of Chemistry at the University of California Berkeley, U.S.A., for his pioneering contributions to surface science. His introduction of basic chemical approaches to solid-state physics revolutionized the understanding of the nature of surface interactions when scientific data on surfaces were scarce, and elevated the study of catalysis to the mainstay of surface science. Dr. Somorjai becomes the 32nd laureate of the Honda Prize¹.

Catalytic chemistry benefits millions of people via its extensive studies of functional materials, especially by finding ways to efficiently synthesize useful substances under specific, mild conditions. Some examples include ammonia-based fertilizers, polyethylene and other plastic polymers, amino acids synthesized by using the Nobel laureate Dr. Noyori's asymmetric hydrogenation process, and catalytic converters that clean up car exhaust. On the ecotechnological front, it is expected that further sophistication of metallic catalysts would substantially reduce the cost of fuel cell production. Dr. Somorjai's finding that the molecules produced in reactions are controlled by the size and shape of catalyst nanoparticles led to the evolution of green chemistry that produces only the desired product molecule without the chemical waste byproducts. In steps toward a green economy, photocatalytic processes hold the key to efficiently make large amounts of hydrogen fuel – the ultimate clean energy – from sunlight and water.

Half a century ago, when Dr. Somorjai began his surface studies, the scientific knowledge of what occurs on surfaces was very little despite experts' recognition of its high importance.

¹ Honda Prize: Japan's first international science and technology award inaugurated in 1980. It is recognized as one of the most important awards of the world by the U.S. International Congress of Distinguished Awards.

As a chemist, Dr. Somorjai felt the need to understand and visually describe surface interactions at the molecular level for which he almost single-handedly developed necessary techniques and instrumentation. His unique, chemical approaches to surfaces led to the establishment of catalyst chemistry, and elevated it to the mainstay of surface science. His peers naturally began to hail him as the “father of modern surface chemistry”.

Today many of Dr. Somorjai’s discoveries serve as the foundation of chemical processes that are extensively studied and used in industry and academia. For example, the chemistry of catalyst particle surfaces is the key technology behind the production of high-octane gasoline and various pharmaceutical products, while chemical reactions on electrode surfaces are used in the electroplating process to produce fuel cells and other forms of batteries. His findings paved the way for changing the composition and property of ice surfaces for high-speed ice skating rinks, and for advanced ultrathin coating of metal, glass and semiconductor surfaces. Dr. Somorjai’s achievements are also used in areas such as medicine, biochemistry, photochemistry, microelectronics, and magnetic storage industry.

In more academic terms, Dr. Somorjai’s major academic achievements to this date include:

1. Development of single-crystal model surfaces to understand catalysis and other surface interactions and extrapolate the results to more complex surfaces. His synthesis of uniform metal and bimetallic nanoparticles in the 1-10 nm size range and controlled shape extended model surface studies of catalysis in a range that overlaps the nanoparticles utilized in catalyst-based technologies.
2. Establishment of Low Energy Electron Diffraction (LEED) crystallography to determine the surface structures of crystalline materials and adsorbed layers of molecules.
3. Development and application of reaction cells working at high reactant pressures (atmospheres) and low pressures (10^{-7} to 10^{-3} Pa) to bridge the pressure gap that stands between traditional surface analysis and newer catalytic reaction studies.
4. Development of non-linear laser optics techniques based on sum frequency generation (SFG) vibrational spectroscopy and its application to chemical analysis of structure and bonding of adsorbed molecules on surfaces at high pressures and under catalytic reaction conditions.
5. Development of applications of scanning tunneling microscopy (STM) to be used under high reactant pressures during chemical reactions.

6. Development of the application of X-ray photoelectron spectroscopy (XPS) to be used under high reactant pressures.

These new instruments permit the monitoring of the surfaces during reactions thus revealing the molecular details of surface chemical processes.

As outlined above, Dr. Somorjai's manifold, unique inquiry into the nature and depth of surface interactions has laid the foundation of surface chemistry. It even contributes to address some of environmental challenges modern industry has been faced with. The Honda Foundation believes his services to society are appropriate for the Honda Prize as an embodiment of the ideals of ecotechnology².

The 32nd award ceremony for the Honda Prize will be held at the Imperial Hotel in Tokyo on November 17th, 2011. In addition to the prize medal and certificate, sub-prize money of 10 million yen will be awarded to the laureate.

For more information, contact the Honda Foundation via phone at +81-3-3274-5125 or via fax at +81-3-3274-5103.

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You may also contact Honda Motor's Public Relations Department at +81-3-5142-1512.

² Ecotechnology: Coined from 'ecology' - the house of civilization - and 'technology.' It has been put forward since 1979 as the guiding philosophy for a better symbiosis between technology-driven civilization and nature.

Dr. Gabor A. Somorjai

University Professor (appointed by the Regents of the University of California)

Professor of Chemistry, Chemistry Department,
University of California, Berkeley

Faculty Senior Scientist and Director, Surface Science &
Catalysis Program, Materials Sciences Division,
Lawrence Berkeley National Laboratory, Berkeley, CA



Education

1960	Ph.D., Chemistry, University of California at Berkeley (UC Berkeley), CA
1956	B.S., Chemical Engineering, Technical University, Budapest, Hungary

Employment

1964-Present	Professor, Department of Chemistry, UC Berkeley Professor, 1972; Associate Professor, 1967; and Assistant Professor, 1964
1964-Present	Faculty Senior Scientist, Lawrence Berkeley National Laboratory
1960-64	Research Staff, IBM, Yorktown Heights, New York

Somorjai was born in Budapest, Hungary, on May 4, 1935. He was a fourth year student of Chemical Engineering at the Technical University in Budapest in 1956 at the outbreak of the Hungarian Revolution. He left Hungary and emigrated to the United States, where he received his Ph.D. degree in Chemistry from the University of California, Berkeley in 1960. He became a U.S. citizen in 1962.

After graduation, he joined the IBM research staff in Yorktown Heights, NY, where he remained until 1964. At that time, he was appointed Assistant Professor of Chemistry at the UC Berkeley. In 1967, he was named Associate Professor, and in 1972 promoted to Professor. Concurrent with his faculty appointment, he is also a Faculty Senior Scientist in the Materials Sciences Division, and Director of the Surface Science and Catalysis Program at the Center for Advanced Materials, at the Lawrence Berkeley National Laboratory. He was appointed University Professor by the UC Board of Regents in March of 2002.

Somorjai has educated 130 Ph.D. students and more than 200 postdoctoral fellows, about 100 of which hold faculty positions and many more are leaders in industry. He is the author of more than 1000 scientific papers in the fields of surface chemistry, heterogeneous catalysis, and solid state chemistry. He has written three textbooks, *Principles of Surface Chemistry*, Prentice Hall, 1972; *Chemistry in Two Dimensions: Surfaces*, Cornell University Press, 1981 *Introduction to Surface Chemistry and Catalysis*, Wiley-Interscience, 1994 and *Introduction to Surface Chemistry and Catalysis*, Second Edition, Wiley 2010; and a monograph, *Adsorbed Monolayers on Solid Surfaces*, Springer-Verlag, 1979.

Awards and Honors

- 2011 ENI New Frontiers of Hydrocarbons Prize
BBVA Foundation Frontiers of Knowledge Award in Basic Sciences
- 2009 Senior Miller Fellow, Miller Institute, UC, Berkeley
Japanese Society for the Promotion of Science Award
Excellence in Surface Science Award from the Surfaces in Biointerfaces Foundation
Fellow of the American Chemical Society
Honorary Membership, Chemical Society of Japan
- 2008 Priestley Medal from the American Chemical Society
- 2007 Langmuir Prize from the American Physical Society
- 2006 Remsen Award from the Maryland Section of the ACS
Honorary Fellow, Cardiff University
- 2003 Cotton Medal, Texas A&M University
- 2002 National Medal of Science
- 2000 American Chemical Society Award for Creative Research in Homogeneous or Heterogeneous Catalysis
Linus Pauling Medal for Outstanding Accomplishment in Chemistry, American Chemical Society, Puget Sound, Portland and Oregon Section
- 1998 Wolf Prize in Chemistry
- 1997 Von Hippel Award, Materials Research Society
- 1995 Chemical Pioneer, American Institute of Chemists
- 1994 Adamson Award in Surface Chemistry, American Chemical Society
- 1990 Honorary Membership in Hungarian Academy of Sciences
- 1989 Peter Debye Award in Physical Chemistry, American Chemical Society
Senior Distinguished Scientist Award, Alexander von Humboldt Foundation
E.W. Mueller Award, University of Wisconsin
- 1986 Henry Albert Palladium Medal
- 1983 Member, American Academy of Arts and Sciences
- 1982 Fellow, American Association for the Advancement of Science
Distinguished Scholar for Exchange with China
- 1981 Colloid and Surface Chemistry Award, American Chemical Society
- 1979 Member National Academy of Sciences
- 1978 Miller Professorship, UC Berkeley
- 1977 Emmett Award, American Catalysis Society
- 1976 Kokes Award, Johns Hopkins University, Baltimore, Maryland
Elected Fellow, American Physical Society
- 1972 Unilever Visiting Professor, University of Bristol, United Kingdom
- 1969 Guggenheim Fellowship
Visiting Fellow, Emmanuel College, Cambridge, United Kingdom

Memberships

- National Academy of Science
American Academy of Arts and Sciences
American Chemical Society
American Physical Society (Fellow)
American Association for the Advancement of Science (Fellow)
Cosmos Club, Washington DC