Professor John O'Mara Bockris
(1923 –2013)

Prof. Bockris, one of the founders of Comité International de Thermodynamique et Cinétique Electrochimiques (CITCE), the forerunner of ISE, and a Fellow of the ISE, passed away on July 7, 2013 in Gainesville, Florida.

He was born in Johannesburg, South Africa on January 5, 1923 and had a primary, secondary, and higher education in Brighton, England. After graduated from Brighton Technical College (now the University of Brighton) with an External B.Sc. degree from the University of London in 1943, he continued his study for Ph. D. degree in Imperial College of Science and Technology, London under the "supervision" of H. J. T. Ellingham, who is well known for the free energy diagram with his name. His Ph.D. research was on hydrogen evolution in non-aqueous solutions and he got his Ph. D. only after 2 years. Profs. Bockris, Conway, and Parsons all mentioned that Prof. Bockris had discussions with Ellingham only a few times and had no actual supervision during his Ph. D. study, possibly because Ellingham was busy with his military duty. While Prof. Bockris was busy working for his Ph. D., he had a job teaching chemistry in Acton Technical College (in West London) and was often on fire watching duty as a member of the "Roof Party" - the team to man the roof at the sign of an air raid and warn of fire bombs or bombers appearing to be near enough for emergency action. These show that he was a man of enormous energy.

Immediately after he got his Ph. D., he was appointed Lecturer in Chemistry Department of Imperial College and started his own research group. The group grew quickly, attracting many students who later became leaders in electrochemistry worldwide including Profs. Parsons and Conway. According to Prof. Bockris, Prof. Fleischman, another graduate student at that time, was working in a lab a corridor away from Bockris' office with I. F. Herringshaw and was frequently within his group both for scientific discussions and social activities.

Prof. Bockris moved to the USA in 1953 to join the University of Pennsylvania as Professor of Physical Chemistry. Thanks to the much stronger support in the USA for science and technology in '50s and '60s, he was able to maintain a very large and active group (averaging 40 students and research fellows) with which he worked on a wide variety of subjects from fundamental to applied electrochemistry, resulting in many important publications. Working on fuel cell, he was concerned

with global warming as early as 1969 and came to an idea of hydrogen based society in 1970. He published an article on “Hydrogen Economy” in 1971.

Prof. Bockris became Professor of Physical Chemistry of the Flinders University of South Australia in 1972 and developed the idea of “Hydrogen Economy”. He founded the International Society for Hydrogen Energy with Professor Veziroglu in 1974. Being in Australia, he linked an idea of “Hydrogen Economy” with solar energy and published “Energy: The Solar-Hydrogen Alternative” in 1975 followed by several related books.

I went to Flinders University to carry out Ph.D. study under his supervision two years after he joined Flinders University. He had only 2 Ph.D. students, both doing theoretical work, at that time and I was suggested to investigate photoelectrochemical hydrogen evolution, one of the key technologies for solar-hydrogen option. Being the first Ph. D. student to carry out experimental work in Australia, there were lots of difficulties. Almost no equipment was available initially and it took quite a long time to receive equipment after it was ordered as it was purchased from the USA or Europe. For example, it took 6 months to import Xe lamp from the USA. Graduate students were often “invited” to his home on weekend for discussions. Initially, I was not “invited” and was bit jealous of senior students because I thought they were invited for dinner or some other social activities. Later, I realized that the “invitation” was, of course, not for social activities but for discussions, and I was not invited because there was nothing to discuss and my English was very poor. It was very tough as he invited us every weekend (each student had a slot in the morning or afternoon on Saturday or Sunday) when he was in Adelaide and it lasted 2-3 hours. After the discussion I often went to the lab either to carry out new experiments or computer simulations to be ready for another discussion on Monday. I am very grateful to Prof. Bockris for the discussions, although I did not think so then, not only because I learned lots about fundamental electrochemistry and my English was improved but also I had opportunities to have discussions on many subjects including social and political issues, economy, and, of course, energy. I often asked myself after I became a Professor in a Japanese University, “Am I giving as much time to my students as Prof. Bockris gave to us?” Prof. Parsons also commented “John’s supervision was very thorough, perhaps a reaction against his own experience of being virtually unsupervised.” We, at least I, “enjoyed” his occasional absence because of his international travel. We were relaxed as each member received only a post card during his trip and there was no e-mail, or even FAX, to push us at that time.

Prof. Bockris’ expectation that his solar-hydrogen energy research would be fully supported by Australian Federal/State Governments and Industry was never met and he returned to the USA to join Texas A&M University as Professor of Chemistry in 1978 (later appointed to Distinguish Professor). He continued his work on energy conversion including photoelectrochemistry and started a bioelectrochemistry project at Texas A&M University. His time there was, however, most remembered by his work on nuclear electrochemistry, i.e., cold fusion and electrochemical nuclear transmutation, which was subject to strong criticism.

He retired from Texas A&M University on June 30, 1997 after more than 50 years of academic life, training many (close to 100) Ph. D. students and numerous postdoctoral fellows and visiting scientists.

He opened, led and sometimes raised controversies in many fields of not only electrochemistry but also energy in general. Just to mention a few, the kinetics and mechanism of electrochemistry of hydrogen and oxygen, electrocatalysis, adsorption and electrochemical oxidation of small organic molecules, electrocrystallization, theoretical electrochemistry, corrosion and passivity, hydrogen in metal, interfacial structure, ionic solutions and ionic liquids, molten silicates and glasses, new methods, photoelectrochemistry, bioelectrochemistry, the hydrogen economy, energy and environment, and most controversial nuclear electrochemistry, i.e., cold fusion and nuclear transmutation. In addition to his numerous (around 750) publications of original papers, he published about 25 influential books ranging from fundamental/applied electrochemistry to socio-economic subjects. "Fundamental Aspects of Electrocrystallization (1967)", "Fuel Cells; Their Electrochemistry (1969)", "Modern Electrochemistry (1970)", "The Electrochemistry of Cleaner Environment (1972)", "The Solar Hydrogen Alternative (1975)", "Environmental Chemistry (1977)", and "Energy Options (1980)". His contribution as an editor of the important series of "Modern Aspects of Electrochemistry" (1954-) and "Comprehensive Treatise of Electrochemistry" (10 volumes; 1980-1985) must be also mentioned.

He was recognized by many awards including Breyer Medal of Royal Australian Chemical Institute (1972), Faraday Medal of Royal Society of Chemistry (1979), and ACS Award in Contemporary Technology (1988).

Prof. Bockris played major roles in the foundation and development of the ISE at an early stage. He attended the founding meeting of CITCE in March 1949 in Brussels organized by Prof. Pourbaix with Prof. Hoar from UK and also played an important role for starting *Electrochimica Acta* by helping Prof. Hoar, the first Editor-in-Chief of the journal until 1972, to negotiate with publishers and acting as a member of Executive Editorial Board from the beginning (1959) to Vol. 17 (1972) when he left the USA. He was National Secretary of Australia for the ISE from 1973 to 1978.

Prof. Bockris spent 7 years in College Station after his retirement and then moved to Gainesville, Florida, following the suggestion of his wife, Lilly, who, unfortunately, died in December, 2005 soon after they moved to Florida. In his letter at his retirement in 1997 he said "My future work will be in the direction of anomalies, not only in chemistry, with the intention to contribute to the change of paradigm in the sciences which is so clearly needed." and published a book entitled "The New Paradigm*:* A Confrontation Between Physics and the Paranormal Phenomena" in 2005. He was hospitalized because he could not swallow properly and was in a hospital for six days before he died due to cardiac arrest. I was told that Prof. Bockris was active and energetic even at the last stage of his life and was still working 10-12 hours every day up until the day before he went into the hospital.

Prof. Bockris' memorial service was held on September 7, 2013 and he is survived by his daughter, Anna, and son, Victor.

October, 2013

Kohei Uosaki