

MYLAPORE VENKARARAMA CHELLAPPA SASTRI
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M. Sastri



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(1915-2002)

Elected Fellow 1976

MYLAPORE VENKARARAMA CHELLAPPA SASTRI (MVC Sastri) is one of India's outstanding scientists in the discipline of chemistry with an impressive record of service for over four decades as teacher, researcher and institution-planner at three top institutions in the country namely the Indian Institute of Science (IISc) Bangalore, and the Indian Institutes of Technology, (IIT) at Kharagpur and Madras.

EDUCATION

Born in Rangoon (then Burma now Myanmar) on 7th may, 1915, he had all his formal schooling and university education there. He obtained his B.Sc. (Hons) (1935) and M.Sc. (1937) from the University of Rangoon. He studied magnetic properties of materials as part of his Masters thesis. He immediately joined the Indian Institute of Science Bangalore to carry out research under the guidance of Professor KR Krishnaswamy. His research work and publications arising out of his Ph D thesis are really most fundamental and marked the beginning of adsorption by activated charcoal, an area still fascinating to the chemists as revealed by the controversies engulfing us regarding hydrogen storage by carbon materials. He was awarded Ph D degree of the University of Bombay in the year 1945.

CAREER

He joined the department of Inorganic and Physical Chemistry of the Indian Institute of Science as Lecturer in the year 1945 and initiated his post doctoral research work in association with Sir Jnan Chandra Ghosh, the then Director of the Indian Institute of Science and the doyen of chemistry in India at that time. This really marked the beginning of Professor Sastri's long and highly productive scientific career. The research programme he initiated in association with Professor Sir JC Ghosh was to investigate the intrinsic mechanisms of solid catalyzed binary reactions particularly, the embryonic chemical interactions occurring at the catalyst surface using the technique of concurrent chemisorption of reactants. It was an experimental challenge as no one had done it before. Three industrially important catalytic processes were chosen for these studies, namely the syntheses of hydrocarbons, methanol and ammonia. With his characteristic innovative experimental skills and tenacious perseverance, Professor Sastri succeeded in unraveling the surface-chemical interactions and the formation of synthetic intermediate complexes.



achievement gained immediate international recognition, especially in the USA and Professor Sastri was invited by the American Chemical Society to present his findings at its historic Diamond Jubilee meeting at New York in 1951, a great honour, indeed for a young Indian Scientist at his prime of his research career.

Professor Sastri continued his research in catalysis at the Indian Institute of Technology, Kharagpur from 1951 to 1961 and subsequently at the Indian Institute of Technology, Madras from 1961 onwards. During his stay at the Indian Institute of Technology, Kharagpur, Professor Sastri was associated with many developments especially the study of reactions at high pressures, in fact he successfully exploited these studies to initiate adsorption studies at high pressures and used it for the study of the mechanism of ammonia synthesis.

INSTITUTION BUILDER

When he joined Indian Institute of Technology, Madras in 1961, his first task was to plan and build-up from scratch the Department of Chemistry. He seized the opportunity to adopt reaction mechanisms materials and catalysis as the *motif forte* of the Department's research base. However, he involved all the sections of the Department participate in the research activity base in some form or other thus creating a unique shining example for intra-departmental co-operation and provided ample opportunities for each of the faculty members to have a sound research base and challenges to face new avenues within the ambit of the Department's research strength. After serving as the Head of the Department of Chemistry at Indian Institute of technology, Madras for nearly 14 years he moved over in 1974 as head of the newly formed Materials Science Research centre at the same institute. This centre was created largely due to his efforts and it is to his credit that he visualized the changed scenario in the practice of science and chemistry in founding such a research centre as early as 1974 at Indian Institute of Technology, Madras. Professor Sastri promoted interdisciplinary research on special materials in this centre. The first major achievement of the centre was the indigenous development of resistors (transistors with positive temperature coefficient of resistance) for use in thermal over-load protective devices as required by BHEL within one year of the centre's formation. His research activity during his tenure as head of the Materials Science Research Centre not only revolved around the generation of new materials for device applications but exploiting these materials for energy conversion processes. In this direction, he had done some pioneering work on the Photo electrolysis of water and used various semiconductor materials. His work with iron oxide systems for harnessing solar radiation effectively is one the pioneering work in this area. During this period and subsequently he channeled all his energy and campaigned for the use of hydrogen as the substitute for petrofuels on a national scale and was remarkably successful in initiating research programmes on hydrogen energy at a number of universities and research centres all over the country.



At IIT, Madras Professor Sastri was not only responsible for nurturing the fledgling Chemistry Department and steer its growth into a centre of excellence that it is today, but he was also responsible to lay the foundation for the creation of a special Instruments Laboratory, which later developed into the Regional Sophisticated Instrumentation Centre (RSIC) as well as for the creation and growth of the Materials Science Research Centre (MSRC) in this institute. Professor Sastri's skills as planner and organizer were put to full use in developing the various research, teaching, development and consultancy activities in the two centres and the department of chemistry in terms of identifying areas of research, selecting and assembling appropriate human and material resources, planning laboratories developing courses and curriculum and building up the necessary infra structural facilities. Professor Sastri had a great passion for the best infrastructural facilities and he was very much ahead of his time in designing and building modern research laboratories.

Professor Sastri was directly responsible for or was involved in building three prominent centres for catalysis research in India, namely, IISc, Bangalore, IIT, Kharagpur and IIT Madras. He is one of the three pioneers of catalysis research in India of his time. He is a great teacher who has trained a generation of scientific personnel who have held prominent positions especially in areas related to catalysis in India and abroad.

HONOURS AND AWARDS

His contributions have been recognized by a number of awards such as the Fellow of the Indian National Science Academy (FNA) 1976, Golden Jubilee medal IISc Bangalore (1985), Eminent Scientist Award of the Catalysis Society of India (1987), Diamond Jubilee Commemoration Award, Indian National Science Academy 1995, Jules Verne Award of the International Association for Hydrogen Energy (IAHE) (2002). He has traveled widely and has visited Johns Hopkins University (1955-56), Carleton University and NRC Ottawa Canada (1965-66), Technical University Berlin (1970), Yokohoma National University and University of Tokyo, Japan (1978). He has attended many International Congresses on Catalysis, most of the World Hydrogen Energy Conferences and also had been member of various international forums like member of the ICC, Board of directors of IAHE and Editorial Board member of the International Journal of Hydrogen Energy. He was the first Chairman of the Hydrogen Energy Task Force (HETF) constituted under the Department of Science and Technology (DST), Government of India with an objective to stimulate and organize hydrogen energy research and development programmes relevant to the country's energy needs and uses. He was also the chairman of the Technical Advisory Committee for Hydrogen Energy, Government of India.



RESEARCH INTERESTS

Professor Sastri's research contributions cover a wide range of topics and can be grouped under two broad areas namely Materials and Catalysis and energy.

His major areas of research on materials and Catalysis can be listed as follows:

1. Adsorption of gases on solids (especially adsorption of Hydrogen and Carbon monoxide in relation to Fischer Tropsch and methanol Synthesis, single gas and mixed adsorption, nitrogen and hydrogen adsorption in relation to ammonia synthesis.
2. Kinetics of Chemisorption processes especially to elucidate the heterogeneity of solid surfaces and also to interpret the empirical kinetic equations that fit the kinetic data of hydrogen chemisorption on metallic and supported metallic surfaces.
3. Studies on the catalytic properties of ternary oxide systems especially spinels, perovskites and a variety of mixed metal oxides especially for test reactions like the decomposition of isopropyl alcohol or nitrous oxide or oxidation of Carbon monoxide. These studies are particularly important in the sense there were clear attempts to evolve structure activity correlations for catalyst selection.
4. Studies on the solid state chemistry of mixed metal oxides especially device materials like posisters and stabilization of lower valent cations in oxide framework.

In the area of energy especially within the scope of Hydrogen energy Professor Sastri's contributions can be classified under the following sub areas:

1. Hydrogen production form Photo-electrochemical decomposition of water using various semiconductor materials as photo-anodes especially in the powder form.
2. Hydrogen storage especially on generic metals and intermetallic hydrides.
3. Hydrogen Energy system –Technology studies for understanding the prospects, resources and impact of introducing hydrogen energy system.
4. Application of hydrogen in energy systems namely use of hydrogen gas as a working fluid in metal hydride-based heat pumps.
5. Non energy applications like direct reduction of iron ores by hydrogen.

AS A TEACHER

Professor Sastri had a remarkable record as a teacher. With a telling power of expression that comes naturally to him he derives home his message in an unforgettable manner. His courses in thermodynamics and heterogeneous catalysis



were remarkable examples of how a course has to be imparted to the students. His delivery, his clear hand writing and methodical way of using the black board are real treat to the students who wish to get the roots of science. Professor Sastri was himself a phenomenon of energy. He was active working several hours on scientific reading and writing as a daily routine till his end. Age had not made the slightest dent on the tempo of his intellectual activity till the very end.

NOTE ON ANCESTRY AND TASTES

Professor Sastri's ancestry is firmly rooted in Mylapore. His surname "Sastri" derives from his forefather's linkage with the famous Kapaleeswarar Temple in Mylapore. In fact to establish this point, His old ancestral home is still there facing the Mylapore tank and temple on the eastern side on the RK Mutt Road (formerly known as Brodies Road). This house is now occupied by the Triplicane Urban Cooperative Society for their distribution centre.

Professor Sastri leaves behind his wife, two sons and two daughters. Professor Sastri was an ardent lover of Carnatic music and probably his interest for Carnatic music was due to his family which is traditionally consisted of musicians and admirers of classical arts. In addition he was practicing Yoga extensively which was mainly responsible for his good and alert mental and physical health till his end.

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