

**MEMORIAL RESOLUTION OF THE FACULTY  
OF THE UNIVERSITY OF WISCONSIN-MADISON**

**ON THE DEATH OF PROFESSOR EMERITUS STANLEY HAROLD LANGER**

Professor Emeritus of Chemical and Biological Engineering Stanley H. Langer passed away on October 25, 2012 at the age of 86.

Stan joined the Department of Chemical Engineering as an associate professor in 1964 after more than a decade of industrial research in various institutions, including the Westinghouse Research Laboratories, the U.S. Bureau of Mines (Synthetic Fuels Division), and American Cyanamid. Before joining American Cyanamid, he held a Guggenheim fellowship in the Department of Physical Chemistry at Cambridge University in England.

Stan was an enthusiastic and imaginative researcher. At Westinghouse, he collaborated on the invention of a high-temperature commercial wire enamel and invented a series of latent-type dissolved catalysts used with epoxy-potting resins for electrical equipment.

At the U.S. Bureau of Mines, he introduced the use of trimethylsilyl ether derivatives for gas chromatographic separations and also collaborated on their initial use for identification of hydroxylic derivatives by mass spectroscopy. Hexamethyldisilazane, not commercially available at that time, was the versatile reagent of choice.

At Cambridge, Stan worked with Professor Howard Purnell and his students to show how hexamethyldisilazane treatment of solids, now common, obviated problems of adsorption on various solid supports. He also developed selective liquid phases for gas-liquid chromatography based on chemical considerations. At American Cyanamid, as a group leader in fuel cell research, he collaborated on the invention of the first commercial fuel cell electrodes introduced by Cyanamid and showed how these electrodes could be used in an electrochemical cell for the efficient purification or pumping of gaseous hydrogen and oxygen. For the latter, this method was adapted extensively by others for oxygen concentration.

For some time, Bob Marshall, then associate dean of engineering, had felt that the chemical engineering department needed someone with a strong interest in invention. A nationwide search identified Stan Langer, who joined the department in Madison in 1964 as associate professor. He was advanced to professor in 1968.

Stan's interest in electrochemical problems fit in well in a department that started out as a department of applied electrochemistry. His research program included work in kinetics, catalysis, solution thermodynamics, hydrometallurgy and chromatography.

Much of Stan's electrochemical work focused on fuel-cell-related electrogenerative processes, in which reactants are combined to give desired chemical reactions or products and electrical energy. Special attention was given to biomass-based ethanol oxidation controlled to produce acetaldehyde. In other work related to environmental concerns on flue gases, sulfur dioxide was oxidized to produce sulfuric acid, and nitric oxide reduction was controlled to produce useful products such as hydroxylamine or ammonia.

Besides the use of chromatography for analytical purposes, Stan and coworkers developed the use of gas and liquid chromatographic columns as a means of conducting chemical reactions to obtain kinetic data, as well as to produce special reagents on site. New liquid phases were invented for chromatographic columns for difficult separations in a program for relating thermodynamic properties of solutions to molecular structure.

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Environmentally compatible hydrometallurgical processes for copper and gold recovery were also studied and demonstrated to be alternatives to ore roasting and cyanide processing.

Stan was one of those exceptional teachers whose enthusiasm and imagination were infectious to his students. Stan often taught the undergraduate course in reactor design as well as the graduate course in kinetics and catalysis. He developed an elective course encompassing all types of chromatography, with a laboratory elective that was arguably the only one of its type in the United States. In addition, he developed an elective course on electrochemical energy generation, which provided a basic knowledge of electrochemistry together with contemporary developments in all types of batteries and fuel cells.

During his period at the University of Wisconsin, Stan directed the doctoral dissertations of more than twenty students. Together they published 139 research papers and book chapters, as well as producing sixteen U.S. patents. He served as a consultant with various industries, presented a number of invited lectures, and served as a visiting lecturer at the Weizmann Institute and the University of Oviedo. His scientific accomplishments were recognized by the University of Oviedo in Spain, which accorded him an honorary doctorate in 1996.

The Department of Chemical and Biological Engineering and the University of Wisconsin-Madison were a large part of Stan's life, and he was proud of the professional success of every department member. Following his retirement in 1996, Stan remained active with the department and he became a member of the Bascom Hill Society. Stan will be remembered for his kind heart and his big laugh, as well as for his many professional contributions.

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