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John H. Sinfelt – a model for catalysis research

John Sinfelt was born on 18 February 1931 in Munson, Pennsylvania, a small town in a bituminous coal mining region. Growing up during the Great Depression, he attended a small, two-room schoolhouse for the first eight years of his education. He was fortunate since his first two teachers rated with the best that he ever had. In addition, his father would teach him algebra after coming home from working in the coal mines all day. After completing high school, John attended the nearby Penn State University, where he majored in chemistry and chemical engineering. After receiving his B.S. in 1951, he entered the University of Illinois, receiving his M.S. in 1953, and Ph.D. in 1954.

Upon graduation, John joined the Exxon Research and Engineering Company. While his research at Exxon has been directed toward fundamental studies of catalysis, he has had the satisfaction of seeing a significant number of his innovations reduced to practice. During his career, much of his work was directed toward understanding catalysis by metals, including bimetallic systems. His work with nickel–copper alloys has become a classic. His work ultimately led to the concept of 'bimetallic clusters', and demonstrated their role in catalysis. This concept led to development of catalysts that are utilized by Exxon in its catalytic reforming process. For his accomplishments in this area, he was awarded the National Medal of Science in 1979 by the president of the United States. John summarized his research in this area in a monograph, Bimetallic Catalysts: Discoveries, Concepts, and Applications.

John has recognized the need to provide better characterization data for catalysts. Starting his career using the more traditional techniques, including kinetics, X-ray diffraction, chemisorption, and infrared spectroscopy, John later assumed a leadership role in the application of sophisticated techniques. He, working with Farrel Lytle, Grayson Via and George Meitzner, provided the experimental basis for the application of extended X-ray absorption fine structure (EXAFS) to probe catalyst structures. The results of many of these studies established him as a leader in this area. Included in his work was the development of experimental approaches that permitted him to use EXAFS to probe the structures of bimetallic clusters. He collaborated for many years with Professor Charles Slichter in the application of NMR to studies of supported metal catalysts and chemisorbed molecules.

John's work has provided scientific bases for several practical applications in petroleum refining, such as catalytic reforming, isomerization and hydrogenation. His work on hydrogenolysis of ethane has provided much insight into hydrocarbon reactions on metal catalysts, and on bimetallic catalysts, in particular.

Among the many awards John has received in recognition of his research are Paul H. Emmett Award by The Catalysis Society; election to the National Academy of Engineering and the National Academy of Sciences; American Chemical Society Award in Petroleum Chemistry; American Physical Society International Prize for New Materials; President's National Medal of Science; election as Fellow of the American Academy of Arts and Sciences and as a member of the American Philosophical Society; Perkin Medal in Chemistry; Gold Medal in Chemistry by American Institute of Chemists; E.V. Murphree

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Award in Industrial and Engineering Chemistry, and the Award for the Industrial Application of Science, National Academy of Sciences.

The papers in this volume represent contributions by John's thesis director, Professor Drickamer, coworkers at Exxon, collaborators from other organizations, and those who have areas of research in common with John.

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