



JOSEPH TALBOT KUMMER

1919–1997

Elected in 1986

“For pioneering the field of ionic conductors, discovering the sodium-sulfur battery, and for seminal work in catalysis and in combustion in fuel cells.”

BY MORDECAI SHELEF

JOSEPH TALBOT KUMMER was born on October 21, 1919, in Catonsville, Maryland, the youngest child of Frederic Arnold Kummer and his wife Marion (*nee* MacLean). His father came from an established Baltimore family. The father earned a civil engineering degree from Rensselaer Polytechnic Institute and was chief engineer of American Wood Company and later general manager of Eastern Paving Block Company. The elder Kummer then switched to a full-time literary career and became a well-published author of novels, short stories, screenplays, musical librettos, and so forth. In addition, he was an exhibited painter of marine scapes. As will be noted below, Joe Kummer inherited both the engineering genes and the inventiveness.

All of Joe’s education was in Baltimore: His high school was the Baltimore Polytechnic (1932–1936), followed by a B.E. in chemical engineering from Johns Hopkins University in 1941 and a Ph.D. from the same institution in 1945. The historical pedigree of his teachers deserves mention. His Ph.D. advisor was the eminent surface scientist and catalytic chemist Paul Emmett (a member of the National Academy of Engineering [NAE]). Emmett himself studied under Sir Hugh Taylor at Princeton, while Taylor’s scientific progenitor was the kineticist

Max Bodenstein in Hanover, Germany. Joe, however, did not choose an academic career path, opting for industry instead.

From his casual remarks I gathered that during World War II, Joe served for a time in the Merchant Marine in the Atlantic convoys. Being by nature taciturn and self-effacing, Joe never elaborated on his service, though it seemed to be quite dangerous.

Concomitant to his Ph.D. work at Johns Hopkins he was a junior project member at the National Defense Research Council from 1941 to 1943. He did not elaborate on the nature of his work there, either.

His first scientific work was quite naturally influenced by the interests of his mentor, Paul Emmett, the mechanisms of the most important catalytic processes: ammonia synthesis and Fischer-Tropsch synfuels synthesis. This work was carried out in Pittsburgh at the Mellon Institute, one of the forerunners of Carnegie Mellon University. It was distinguished by the then-novel application of hydrogen and carbon isotopes, both stable and radioactive, for the study of heterogeneous catalysis.

Moving to Dow Chemical in Midland, Michigan, Joe was involved in the improvement of several chemical manufacturing operations, with the results of these efforts being mainly proprietary in nature. His publications from this period relate to the important oxidation of ethylene to ethylene oxide on a silver catalyst and surface segregation. During this period Joe published a short paper on the latter subject, which was referred to by his NAE colleague M. Boudart as "a study that may well be the most elegant catalytic investigation of the sixties if elegance implies economy of means to convey an important message."

The last and main part of his scientific career was at the Scientific Research Laboratories of the Ford Motor Company from 1960 to 1984. There his accomplishments were nothing short of prodigious. The studies can be grouped into the following broad fields:

Automotive emissions—studies of the surface reaction of nitric oxide by isotope labeling, selective reduction of

nitric oxide, three-way automotive catalysts, and studies of atmospheric aerosols.

Solid-state materials—ionic conductivity, beta-alumina solid electrolyte (BASE), Na-S battery, and alkali-metal thermoelectric energy converter.

Internal combustion—NO_x formation in internal combustion engines and effects of emission controls on fuel economy.

Electrochemistry—biofuel-powered fuel cells and rechargeable batteries.

In all these fields Joe's contributions were invariably original, one might even say seminal, and patentable. His work on automotive emissions contributed mightily to the practical implementation of automotive emissions controls. His solid-state materials work spurred the whole field of ionic conductivity and countless investigations worldwide.

Whenever a scientific consultation or an opinion was sought by anyone at the Ford Laboratories or by an engineer in other parts of the vast enterprise, the path invariably led to Joe's modest office, where the advice was generously and unselfishly offered. Being an inveterate engineer's engineer, Joe performed a large part of the experimental work himself at the bench. He was able to conjure clever experimental apparatus out of on-shelf spare parts. Soon after the appearance of the first personal computers, Joe Kummer rigged one up. He avoided the limelight and corporate-ladder climbing and resisted promotion to managerial positions. Very rarely did he travel to meetings, whether at home or abroad, or take part in large gatherings. Nevertheless, his name was very well recognized in the engineering community.

Five outstanding chemical engineers sponsored his nomination to the NAE. Joe Kummer was the first recipient of the American Chemical Society's award for the "Chemistry of Contemporary Technological Problems." He received several awards from the Michigan Section of the ACS.

His wife, Ruth, noted that:

“Joe was an avid reader who enjoyed historical and cultural writings but *Chemical Abstract* and *Chemical Engineering Journals* enriched his professional and creative mind. In retirement the challenge was to decode computer programs and tinker with discontinued components. Often he spent time in the university libraries doing literature searches that his peers appreciated.”

As stated earlier, Joe could conjure clever experimental apparatus that would not pass the requirements of the AIA in home design but was functional. His application on one occasion was a piece of a broomstick with two pieces of wood to hold rabbit ears to receive TV signals from the north, south, east, and west, a sight to be seen, and which was displayed in the living room with four switches to pick signals.

Truly a person who could focus on the heart of a topic! His philosophy was “give me the facts and spare me the details.” In spite of his efficient manner, he was sensitive and attentive to others, even the youngest child.

Joe dressed modestly, and his material demands were minimal. It was quite a sight to see him shoehorning his 6'8" frame into a Ford Escort. He raised a family of three sons, two of them engineers, and the third in medical records. His daughter is a physician. Early engineering activities often entertained five grandchildren with fond memories. Two great-grandchildren did not have the time to know him. His wives Elizabeth and Phyllis preceded him in death. Joe Kummer died in retirement in Ypsilanti, Michigan, on June 27, 1997.

