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Hellmuth Fischer 1902-1976

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This issue of the *Journal of Applied Electrochemistry* is dedicated to the memory of Hellmuth Fischer, an outstanding scientist who devoted most of his scientific efforts to the harmonization of pure and applied research in electrochemistry. His life span (he was born in Berlin on 24 August 1902 and died in Karlsruhe on 2 February 1976) covered the darkest years of this century: World War I, the inflation in Germany, the great Depression, the Nazi period, and World War II with all its disastrous consequences. During this period his dream of a scientific career may often have appeared to him as a mere chimera. But after Hitler's rule had ended, he participated enthusiastically in the restoration of German science and not only witnessed the economic recovery of Western Germany, but also finally turned to the academic career which, had political circumstances been different, he very probably would have begun much earlier.

Fischer grew up in an atmosphere of science and art. His father was a chemist who became head of the Chemical Laboratories of the Siemens & Halske Company, and his mother was a violinist. His interest in chemistry, nurtured by his father and supported by his schoolteachers, led directly to his enrolment in chemistry at the University of Berlin in 1921, after having passed the Abitur, the decisive examination for admission to a German university. By 1926, he had already finished his thesis and earned the doctoris de rerum natura degree from the University of Berlin. The theme of his thesis suggested by Alfred Stock, a professor of inorganic and analytical chemistry famous for his precision and exactness in chemical analysis, brought him directly into contact with analytical problems. He developed new methods for the detection and analysis of beryllium, which was studied during this period for its possibilities as a material for construction of light engines and other machinery. In the course of these studies, he began to exploit the high sensitivity of complex-forming organic reagents for analytical purposes and developed the so-called dithizone method as a universal reagent for the detection of nearly all heavier metals. He became well known for this work very early in his career.

Fischer's doctoral studies had already been partially performed in the Siemens & Halske laboratories, where he had been employed since 1925. It was this close contact with applied research problems which led him to the field of electrochemistry. His doctor father had applied for some patents for the electrolytic winning of beryllium from molten salts by electrolysis, which were to be tested in cooperation with the Siemens & Halske laboratories. Fisher became responsible for this task. In this industrial laboratory he also encountered a great variety of corrosion problems, particularly with such light metals as beryllium, aluminium and zinc. He studied these problems by electrochemical techniques and attempted their solution by galvanic deposition of metals or by the anodic formation of protective oxide layers. He became a pioneer in the development of the anodization of aluminium and developed the so-called 'eloxal' technique in his laboratory.

His employer soon recognized Fischer's talents and great versatility and assigned him, at the age of 36, the responsibility for all materials research and electrochemistry in the Siemens & Halske laboratories. This was a very large field, and most people in such a position would have become completely submerged in management and lost track of creative scientific work. Not so Fischer. Not only did he succeed in following the actual scientific development in his special fields of interest, he also personally supervised a great deal of experimental work and published many original papers, either on his own or together with a few co-workers. He had to perform most of these 'hobbies' either before or after his official working hours, and particularly at weekends. During this period, he obviously learned to organize his time most efficiently, which enabled him, then and in later years, to fulfill the myriad duties he had assumed.

It was during this period that he became fascinated by the problems which continued to interest him until the end of his life – namely, the mechanism of electrolytic deposition and dissolution of metals and the influence of inhibitors on these processes. Of his approximately 180 publications, more than fifty are concerned with inhibition, with an equal number devoted to the electrolytic deposition of metals, particularly the problem of crystal growth, their morphology, and nucleation. His systematic studies of these problems culminated in his world-renowned book *Electrocrystallization*, the German edition of which was published in 1954. In this book, he provided an exhaustive synopsis of the contemporary knowledge of this very complex field. The book was written during a period of his life when Fischer was overburdened with duties in the Siemens & Halske Company as head of the materials research laboratories, which were after the war years spread over four different locations in Germany. The bomb-shattered laboratories in Berlin had been partially transferred to other places when this company reorganized its production and research facilities in Western Germany. This book demonstrated again Fischer's enormous capacity for work and his discipline and organizational efficiency. I have often personally admired how systematically and well in advance he prepared himself for any commitment. One could be sure that a manuscript for a lecture was ready very soon after he had accepted the invitation. These are rare virtues among scientists, and for Fischer they were consequential. His promptness and reliability, his experience in organization and his amiable personality made him ideally suited to responsibilities in scientific organizations, both nationally and internationally.

Research and similar activities became predominant in his life with his appointment in 1960 as professor of electrochemistry at the Technical University of Karlsruhe. His interest in academic affairs had awakened much earlier, in 1937 he had submitted a 'Habilitations-Schrift' to the Science Faculty of the Technical University of Berlin. He obtained in 1938 the status of a 'Dozent' with nominally the right of lecturing. However, in order to avoid political implications, he did not use this right until the end of the war. In 1946, when the German universities reopened, he began lecturing on electrochemistry at the Technical University of Berlin and soon became more and more involved with teaching and research, in addition to his professional obligations.

The transfer of the laboratories for which he was responsible forced him to leave Berlin and settle with his family in Karlsruhe, where the Siemens Company had established new materials research laboratories. The Technical University of Karlsruhe had a long tradition in applied electrochemistry (Fritz Haber held his first academic position and wrote his book on technical electrochemistry there). It was therefore not surprising that this university was delighted to have such a man in the immediate neighbourhood and in 1950 offered him an honorary professorship, with the intention of re-establishing an electrochemistry research group. In the same year, in acknowledgement of his success as a lecturer, he was awarded the status of a professor from the Technical University of Berlin.

Although this company gave him much freedom, it must have been the most difficult period of his life, for he had to fulfill so many different obligations both industrial and academic. He did this in spite of his delicate health, which was the result of his early research on beryllium, when it was not yet known that this element was so poisonous and he became one of the first victims of berylliosis, a poisoning by beryllium. Throughout the rest of his life he had to suffer from the hazards he had unconsciously exposed himself to during his thesis work and in his first laboratory years. Finally, Fischer became aware that he could not continue in this working style until the end of his professional activities. It was a very fortunate solution to this dilemma, therefore, that in 1960 the Technical University of Karlsruhe offered him a chair in electrochemistry. He accepted and soon was promoted to a full professorship. This provided the opportunity to concentrate fully on his scientific interests. During his industrial years, he had become aware of the importance and the fascination of applied research problems but had suffered from the restrictions imposed on basic research. In his academic position, he could now combine both aspects of his interest, the fundamental and the applied. This situation was most satisfying, and Fischer could inspire many students to perform research in electrochemistry with a

view to its possible applications. Today, many of his former students hold important positions in academic or industrial institutions.

It has already been mentioned that Fischer served in many capacities in scientific organizations. One of his most prominent positions was the presidency of the Comité International de Cinétique et Thermodynamique Electrochimique (later International Society of Electrochemistry) which office he held from 1961 until 1964.
He was quite active in applied electrochemical research in Germany, particularly in corrosion research, and he organized committees for corrosion studies in the DECHEMA (German institution for chemical engineering and device development). His scientific and organizational work has been acknowledged by many institutions: he received an honorary doctorate from the Technical University of Dresden; became an honorary member of the Société de Chimie Industrielle de Paris; was awarded the Cavalaro Gold Medal for his work on corrosion inhibition, a scientific achievement award of the American Electroplaters' Society and the Gold Medal of the DECHEMA; and he was elected an honorary member of the German Society of Galvanoplaters.

After his retirement from his professorship, even having suffered a heart attack, Fischer's scientific activity never ceased. Until his last days he took an active part in the scientific affairs of many organizations. An enormous help in all his work and his personal life was, for him, the harmonius atmosphere in his family. He and his wife Irene, whom he had known since his student days and married in 1932, had two sons, both of whom are chemists today – one in an academic and the other in an industrial position. Thus, each of them continues an aspect of their father's tradition. All colleagues who met the Fischers on the occasion of a scientific congress or in their home will never forget the warm and amiable atmosphere they radiated. The scientific community in pure and applied electrochemistry will remember Hellmuth Fischer as one of the great promotors of their field.