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Preface

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Professor Piet Bergveld started his research activities in the early 1970s with a clear vision and drive to develop revolutionary measurement methods for biological systems, such as novel recording techniques of action potentials of nerves located in the legs of grasshoppers.

His interdisciplinary approach and his conviction to improve recording of biological phenomena by combining the sensing and signal treatment functions in one and the same component has led to the invention of a complete new class of sensors using the field effect. Professor Bergveld discovered that field effect transistors without a metal gate and with the gate insulator directly exposed to the electrolyte solution responded to changes in activity of certain cations (H, Na, K,). Those observations led to the invention of the ion sensitive field effect transistor (ISFET). After the invention of the ISFET, Professor Bergveld developed an important research activity in studying the fundamentals of operation of this novel class of devices. The interdisciplinary approach followed by Piet Bergveld strongly stimulated a series of additional inventions, such as using the chemical reactivity of the gate insulator surface of ISFETs to mimic protein chemistry.

The research activities concerning ISFETs have stimulated and initiated research all over the world dealing with these new sensors. A large number of Workshops, International Conferences and Summer Schools were organized and a new field of research was born.

Professor Bergveld intensified his research activities with a strong interdisciplinary character and he added chemical actuation functions to the sensing system, resulting in novel microsystems for chemical analysis.

Professor Bergveld also initiated very successful research programs in the area of physical sensors, such as pressures sensors, accelerometers, and microphones.

His vision to combine sensing and actuation in the same measurement system has also resulted in the start of another exciting research field, namely miniaturized chemical analysis systems or micro-TAS.

Amongst his numerous talents, one particular should be mentioned. Professor Berveld took really very seriously his responsibility to supervise numerous Ph.D. and undergraduate students, sharing with them his scientific curiosity and enthusiasm. All of his Ph.D. students remember the great time and chance they had to study under his guidance.

In this special issue of Sensors and Actuators, many colleagues report in their respective papers on the impact of the original concepts of Professor Bergveld on current and future research in miniaturized measurement systems.

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