

החברה הישראלית לכימיה THE ISRAEL CHEMICAL SOCIETY

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November 6, 2024

Dear ICS members,

We are saddened to announce that Prof. Alex Pines passed away on November 1 in Berkeley, California.

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Prof. Alexander Pines (1945 - 2024)

Alexander Pines was born on June 22, 1945, and grew up in Bulawayo in Southern Rhodesia (now Zimbabwe). He obtained his B.Sc. in mathematics and chemistry from The Hebrew University of Jerusalem (1967) and Ph.D. in chemical physics from MIT (1972) and joined the UC Berkeley faculty later that year. He was promoted to Associate Professor in 1975 and to Professor in 1980. He was the Glenn T. Seaborg Professor Emeritus at UC Berkeley, Chancellor's Professor Emeritus and Professor of the Graduate School, and a member of the California Institute for Quantitative Biosciences (QB3) and the Department of Bioengineering.

Pines was a pioneer in developing and applying NMR spectroscopy, originally in solid-state NMR. With John S. Waugh, he demonstrated the time reversal of dipole-dipole couplings in many-body spin systems. He introduced cross-polarization and high-resolution NMR (proton-enhanced nuclear induction spectroscopy) of dilute spins such as carbon-13, nitrogen-15, and silicon-29 in solids, thereby helping to launch the era of modern solid-state NMR. He introduced multiple-quantum spectroscopy, zero-field NMR, broadband and adiabatic sech/tanh pulses for MRI, double rotation and dynamic-angle spinning of quadrupolar nuclei, and iterative maps for quantum control. He developed methods combining optical pumping and cross-polarization to observe the selective "lighting up" of surface and solution NMR and magnetic resonance imaging (MRI) using laser-polarized xenon. Pines developed novel spin polarization methods, *ex-situ* and mobile NMR and MRI, targeted NMR sensors for molecular imaging, ultralow and zero-field NMR and MRI, detection of magnetic resonance amplified using laser magnetometers, and miniaturization of NMR, including its combination with microfluidic ("lab on a chip") technologies. Techniques he has developed have been widely adopted to investigate molecular structure and organization and have substantially impacted chemistry, materials science, and biomedicine.

Among his many prestigious awards and honors, Pines received the Wolf Prize for Chemistry (1991, together with Richard R. Ernst), the Langmuir Medal of the ACS, the Faraday Medal of the Royal Society of Chemistry, the F.A. Cotton Medal for Excellence in Chemical Research of the ACS (1999), and the Russell Varian Prize at the European Magnetic Resonance Conference (2008). Pines was also recognized by numerous teaching honors, including the University of California's Distinguished Teaching Award. He was a member of the U.S. National Academy of Sciences, the American Academy of Arts and Sciences, and a Foreign Member of the Royal Society, and the Indian Academy of Sciences. He was Doctor Honoris Causa at the Weizmann Institute of Science, Universite Paul Cezanne, University of Paris, and the University of Rome, and past President of the International Society of Magnetic Resonance.

Alex had a lifelong passion for science, music, and chess. Over two hundred self-dubbed "Pinenuts" have passed through his laboratory, graduating to research, teaching, and other creative activities worldwide. He is survived by his wife, Ditsa Pines, five children, and six grandchildren.

The ICS and the entire community of Israeli scientists mourn the loss of an outstanding scientist.

Ehud Keine

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