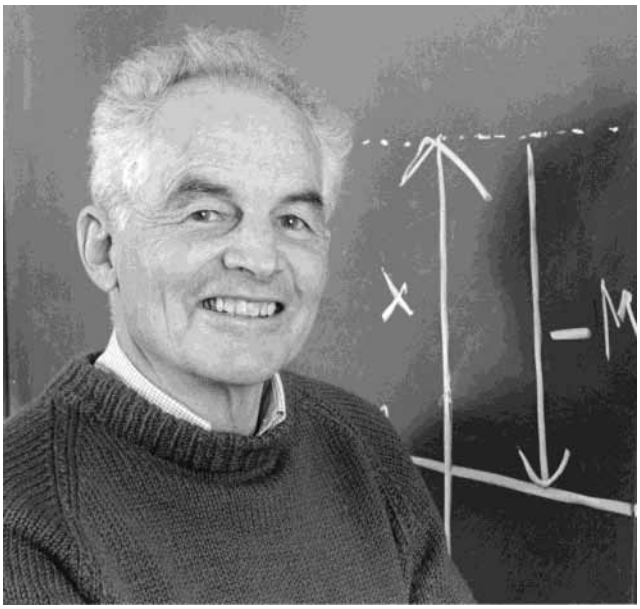
THE JOURNAL OF PHYSICAL CHEMISTRY A

 VOLUME 107, NUMBER 40, OCTOBER 9, 2003



Biography of Andreas C. Albrecht
June 3, 1927−September 26, 2002

Andreas Albrecht was born in California but spent early parts of his childhood in Washington, DC, Baton Rouge, and Vienna, where his father, an anthropologist originally from Germany, was doing his doctoral work. After returning to California, Andy completed his high school and entered Berkeley, from which he obtained a BS in chemistry in 1950.

It was at Berkeley that Andy first met his wife, Genia. He noticed her in a chemistry lab they had together and was fond of telling how he went over to see if she needed a little help with her lab only to discover that, in fact, she was doing extremely well, and if anything was in a good position to help him. They moved to Washington to pursue graduate studies and selected Labor Day for their wedding, likely out of respect for the political significance of that day. It was a civil ceremony, but of course the judge had the day off. They hired a live-in boat for their honeymoon, and their first stop was the island off of Seattle where the judge lived. The judge called a few people in from the back yard to act as witnesses, and they were on their way.

In 1954, under the direction of W. T. Simpson at the University of Washington, Andy finished his Ph.D. dissertation on "Excited electronic states in *N*,*N*,*N*′,*N*′-tetramethyl-*p*-phenylenediamine and *p*-dimethoxybenzene." The couple then moved to Cambridge, where Andy worked as a postdoctoral fellow at the Massachusetts Institute of Technology with Walter Stockmayer, while Genia worked at Harvard.

When it came to looking for a more permanent position, Andy approached Peter Debye who happened to be spending some time at MIT. With a heavy accent, Debye suggested that Andy apply to Cornell where the department was looking for someone to teach analytical chemistry. Cornell's budget for recruiting being not what it is now, the interview trip found Genia and Andy staying at a campsite somewhere outside Ithaca. Andy's approach, that analytical chemistry really was physical chemistry, apparently got him hired in 1956 as an instructor and a year later as an Assistant Professor. He became an Associate Professor in 1962, and Professor in 1965.

During his long career, Andy was a National Science Foundation Science Faculty Fellow, several times an exchange scientist in the United States−USSR Academy of Sciences Program, a visiting professor at the University of Arizona, the

10.1021/jp030842v CCC: $25.00
Published on Web 10/02/2003

University of California, Santa Cruz, the State University of New York College at Purchase, and the Rockefeller University. He was also a Fellow of the Japanese Society for the Promotion of Science, a Fellow of the American Physical Society, and a Fellow of the American Academy of Arts and Sciences. He was a Frontiers in Chemistry Lecturer at Texas A&M and the Gillespie Lecturer of the Royal Society at University College London. He received the 1986 New York Academy of Science Polychrome Corporation Award in Photochemistry, he was the 1988 Lippincott Medalist, and he received the 1990 Earle K. Plyler Prize from the American Physical Society. He served on the advisory boards of several scientific journals, on government advisory panels, and was a consultant for American Cyanamid, IBM, and Eastman Kodak.

As important to him were the students and postdocs and coworkers who worked with him and who benefitted from his warmth, gentle humor, and scientific insight. A list of his former students and postdocs is provided in this issue.

Andy is probably most widely known for his theoretical and experimental contributions to Raman spectroscopy. In 1961 [number 16 on his publication list] he spelled out the vibronic origins of Raman scattering. Many papers followed, but a particularly significant one appeared in 1971 [64], where he presented the theory of preresonance Raman dispersion. Two analytically distinct dispersion terms were identified which have become known as the "Albrecht A term" and the "Albrecht B term." They are routinely and widely used in analyzing preresonance as well as resonance Raman excitation spectra in a variety of materials.

The Albrecht group was one of the first to introduce transform methods into Raman spectroscopy. The formal, two-way connection between the linear absorption spectrum and the Raman excitation profile was first proposed by them conceptually in 1981 [116b] and then with rigorous implementation in 1986 [149, 150]. These transform techniques are to Raman spectroscopy what the Kramers−Kronig transform is to reflectance spectroscopy.

Broad applications are made possible by these interferometric spectroscopies. They provide an entirely new way of measuring both frequencies with exceptionally precise resolution as well as coherence times (dephasing rate constants) with a new level of accuracy.

In 1961 [17], Andy was one of the first to define and develop the concept of 'photoselection' − the use of polarized light incident on molecularly random samples to obtain oriented molecules for spectroscopic and photochemical studies. Later, the concept was generalized to multiphoton spectroscopies, both in theory and in experiment, to provide the first example in two-photon spectroscopy [90], and then to culminate with a general application to three-photon absorption in any amorphous phase [151, 152].

In the course of their inventing thermal lensing spectroscopy in 1976 [83], the Albrecht laboratory was one of the modern pioneers in developing the concept of 'local modes' in molecules. Several key experimental and theoretical papers appeared in the mid to late seventies to advance the concept in important ways.

The discovery by the Albrecht group in 1960 of photocurrent in rigid organic solutions and its multiphoton nature was followed by a continuous series of contributions to photoelectricity in the molecular condensed phase. New "solid state" phenomena first seen in organic materials in Albrecht's laboratory include electrophotoluminescence, isothermoluminescence, and stimulated emission − all identified in the past century as important properties of the class of compounds called the inorganic phosphors.

A unified view of Raman scattering and resonance fluorescence, including the phase and amplitude role of the incident light, was presented by Andy in a series of papers [publications135, 148, 153, 156, in particular]. In 1986 [153] his group showed how the well-known Kramers−Heisenberg equation for Raman scattering actually contains spectrally distinct resonance fluorescence and resonance Raman emission when incoherent light is used.

In 1987, a new type of generalized Rabi oscillation was discovered in his group. It is seen in coherent four-wave mixing experiments in which two of the incident waves are derived from the same incoherent light beam. These oscillations represent a new class of interferometrically measured detuning oscillations. The Albrecht group also reported the first experimental observation of a new sub-Raman line width spectral feature in coherent Raman spectroscopy [175], after having predicted this new kind of ultra sharp spectral feature theoretically [174].

In the period between 1989 and 1991, in collaboration with others at Cornell, the Albrecht group applied femtosecond (fs) time-resolve and nonlinear spectroscopy to the investigation of excited-state dynamics in photosynthetic antenna systems [163−167,172, 188−180, 186]. Their work was the first to show the involvement of a carotenoid ^1A_g state in energy transfer to chlorophylls using two-photon fluorescence excitation [169] and to describe the ultrafast dynamics of energy transfer in bacterial B800−850 antenna system [166, 180]. Experimental and theoretical work on carotenoid photophysics produced a wide range of papers [181−182,184−185].

Elucidating the nature of line broadening in condensed phases, and thereby the dynamics in liquids had long been a main theme of Andy's research. In the early nineties, his group applied ultrashort fs pulses to characterize the dynamics responsible for spectroscopic line broadening in liquids. By means of the fs four wave mixing techniques, they measured for the first time in the time domain the characteristic time constants and coupling strengths of the dynamical processes responsible for the vibrational [188] and electronic [199] dephasing in liquids. His work made a significant contribution to the notion that classification into homogeneous and inhomogeneous broadening is subject to the measurement time scale in liquids.

After a visit to Japan in the mid 1980s, Andy became interested in the application of noisy light as a way to probe ultrafast material dynamics. He and his group studied the noisy light based coherent Raman scattering (called I(2)CRS) process [174]. Using narrowband detection they observed radiation difference oscillations in the I(2)CRS interferograms [216]. His group explored the resonant−nonresonant contribution to I(2)-CRS [198,217] and developed a two-dimensional detection scheme [208] which allowed Raman spectrograms to replace interferograms as a way to examine the properties of a Raman vibration with exquisite sensitivity to vibrational frequency shifts, dephasing rate constants, and the resonant to nonresonant hyperpolarizibility ratio [214]. During the mid to late 1990s, the technique of factorized time correlation (FTC) diagram analysis was developed in Andy's group [207]. Also in the late 1990s Andy extended the (third order) I(2)CRS work to the study of fifth order cascade signals attendant with genuine fifth order Raman spectroscopies [230,232]. This led to an important contribution to the mainstream short pulse literature that of the parallel mechanism of contaminating third-order cascade signals attendant with genuine fifth-order signals [221].

In very recent years after a visit to the European Laboratory for Nonlinear Spectroscopy in Florence, Andy's interest turned to nonlinear optical processes that can be specific to chiral molecules in solution [239−245]. The work was still in progress when Andy passed away; an article appears in this issue [245].

Andy Albrecht will be remembered by co-workers, colleagues, and friends as one who brought deep thinking, gentle humor, and genuine curiosity to each relationship. An outstanding teacher as well as researcher, he guided the undergraduate and graduate careers of many who have become successful in their careers, in both science and other fields. The guidance was not always scientific, since music, the outdoors, and politics were often topics of deep discussion. We miss his enthusiasm, counsel, and insight.

Peer Fischer

Paul Houston

Roger Loring

Benjamin Widom
Cornell University