Special Issue Dedicated to the Memory of Therese M. Cotton

Therese M. Cotton was a remarkable scientist and very fine person. Therese died on October 26, 1998, after a valiant fight against cancer. Her passing was recently eulogized in a most eloquent manner by W. E. Smith (see *Biospectroscopy*, Vol. 5, No. 1, 1999, pp. 1–2). Her friends and colleagues will miss her enormously. Therese was best known scientifically for her outstanding contributions to the development of resonance Raman spectroscopy (RRS) and surface-enhanced resonance Raman spectroscopy (SERRS) as tools for the characterization of biological molecules and especially its application to the study of photosynthetic systems. Therese was without peer in this important area of science. Her SERRS work first pioneered and then established without doubt the viability of this novel approach to the study of surface-confined biomolecules. In addition, Cotton made an impressive list of contributions to (1) the electrochemistry of adsorbed biological molecules—notably the cytochrome *c* system; (2) Ag colloid chemistry—the laser ablation method for their formation and their assembly into two-dimensional arrays; (3) characterization of Langmuir–Blodgett films by spectroscopic methods and X-ray reflectivity measurements; and (4) the photoelectrochemistry of adsorbed molecules. This unique body of work is a most fitting legacy that will establish her place as a leader in the fields of analytical and biophysical chemistry in the late 20th century.

In this special issue of *Biospectroscopy*, we celebrate the life and work of Therese M. Cotton. Invited contributions of original, peer-reviewed research papers have been gathered from leading researchers in the field of vibrational spectroscopy applied to the study of the structure and function of biological molecules. The thematic link in these contributions to Therese's own research emphasizes the techniques of RRS, surface-enhanced Raman (SER) spectroscopy, and/or the surface or interfacial nature of the biological target molecule.

Three fine contributions represent the area of RRS. Sandy Asher's laboratory presents a CW ultraviolet resonance Raman study of the conformation of angiotensin II in water, lipid micelles, and acetonitrile. This work beautifully illustrates the power of ultraviolet RRS as a tool for the examination of protein conformation at the water–micelle interface. Tom Spiro and colleagues examine the tunable dye laser excited resonance Raman spectra of bacteriopheophytin and bacteriochlorophylls in *Rb. sphaeroides* reaction center preparations. The resonance Raman spectra obtained in this work are of extremely high quality. Selective excitation of separate bacteriopheophytins on the active and inactive sides of the reaction center is demonstrated. Near-infrared excitation in the 800-nm range reveals the resonance Raman spectra of the accessory bacteriochlorophylls. Therese Cotton would have loved this paper. George Chumanov and colleagues give us a detailed study of the Soret band excited resonance Raman spectra of wild type yeast iso-1-cytochrome *c* and its F82H mutant. Analysis of these spectra reveal that in oxidized F82H the axial ligands are both histidine while in the reduced form the sixth ligand switches from His-82 to Met-80. Furthermore the porphyrin macrocycle is found to be less distorted in the mutant than in the wild type protein for both oxidation states.

Turning now to SER spectroscopy and SERRS, we are treated to excellent papers submitted by W. E. Smith, Robin Garrell, and Jeanne Pemberton. Smith and colleagues demonstrate that SERRS is a powerful detection method for DNA analysis. It has the sensitivity to be competitive with fluorescence detection and has superior molecular specificity. It is believed that this techniques will have a significant role in the development of fast analytical methods for molecular biology. Garrell and Ooka provide us with a SER spectroscopy study of the adsorption of peptides containing 3,4-dihydroxyphenylalanine (DOPA) on colloidal gold. Coordination to the gold surface is found to take place through the catechol oxygens of the DOPA residue and through the primary amine groups. Applications to the development of synthetic adhesives are discussed. Pemberton and Chamberlain contribute a novel technique for the acquisition of SER spectra of model biological membranes at the air–water in-

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terface. In this approach a buoyant thin Ag film of coalesced colloids is grown electrochemically in the subphase. High-quality SER spectra are obtained that reveal vibrational signatures from all parts of dipalmitoyl phosphatidic acid. Of particular significance is the observation of vibrational features attributable to the phosphatidic acid head groups that permit inquiry into their chemical state and orientation.

In the final article, Geri Richmond and B. L. Smiley train the power of the vibrational sum frequency generation (VSFG) technique on the problem of the molecular organization of phosphocholines (PCs) adsorbed at a liquid–liquid interface. Prior to the discussion of the results, an excellent, short tutorial on VSFG is given. C_{18} and longer chain PCs are found to form well-ordered interfacial layers with all *trans* conformation, whereas C_{16} and C_{15}-PCs form disordered layers. This is a wonderful study that clearly indicates the chemical information content of VSFG.

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