In this issue

Raman spectroscopy

The special section on Raman spectroscopy commemorates the 70th year of the discovery of the Raman effect. C. V. Raman recorded the first spectrum of the effect, which was subsequently named after him on 28 February 1928, a day which is now celebrated as National Science Day every year. Since that time Raman spectroscopy has transformed not only into a tool to understand the complex microscopic and time-dependent molecular structural phenomena but also to help in many diverse applications in industry and medicinal research. This has mainly been possible due to theoretical advancements and technological development. From an academic point of view, the eighties and nineties can be considered as the third generation of Raman spectroscopic research. This period has seen the development of time-dependent description of the resonance Raman theory and also the introduction of ultrafast (in tens of femtoseconds) laser systems opening up vast areas of unknown photochemical and photophysical processes. In particular, studies related to vibrational coherence and structural aspects related to charge transfer processes have been initiated. The potential of Raman spectroscopy in the area of vibrational coherence is well illustrated in the special issue of *J. Raman Spectroscopy*, 1997, vol. 28. The second generation in Raman spectroscopy research was initiated in the early sixties with the advent of laser systems. Of course, the first generation of research was mainly developed with mercury arc lamps, sunlight, etc. as light sources and prism spectrometers to disperse the scattered light. In this issue, we have reproduced the first three papers published by C. V. Raman in 1928, which actually describe how the first experiments were conducted and what was observed. The equipment used by C. V. Raman is illustrated on the cover page. The richness of C. V. Raman's originality is very appealing to present-day Raman spectroscopists, who routinely utilize the technologically superior Raman spectrometer which can almost be used as a black box.

In this special issue, we have attempted to provide a glimpse of the recent status of the technique in academic research. The first two contributions are personal accounts of the experiences of two well-known Raman spectroscopists. In his paper, M. Ito recounts his entry and contributions during the first two generations of Raman spectroscopy and he calls the second generation Raman spectroscopy the 'Raman renaissance'. Raman scattering is such a weak process, i.e. only one in every million incoming photons emerges as Raman scattering. C. V. Raman used light from a mercury lamp or sunlight, which contains a large number of wavelengths that need to be separated to get a single wavelength (monochromatic light). Light of a defined wavelength is then used to impinge upon the sample in order to observe the scattering process. It seems, now, that it was a miracle that Raman indeed managed to observe the scattering process. Naturally, very intense light sources are necessary in order to observe the Raman scattering comfortably. The discovery of lasers provided that light source. Further, the concept of resonance Raman spectroscopy was also initiated and experimented during that period as discussed by Ito (**page 300**). Tom Spiro, likewise has presented a lucid account of the development of applications of resonance Raman spectroscopy to heme proteins (**page 304**). In his article, Spiro recounts what he calls 'the serendipitous discovery of inverse polarization and vibronic scattering in heme protein Raman spectra'. His presentation of the importance of the availability of lasers and the excitement in observing the manifestation of the inverse polarization and vibronic scattering makes interesting reading and provides a glimpse of the historical development of Raman spectroscopy.

Two articles are by A. Jayaraman *et al.* (**page 308**) and A. K. Ramdas *et al.* (**page 317**), both of whom have had the opportunity to work with C. V. Raman and their articles form authoritative reports on the status in their areas of research. Understanding the response of vibrational modes at high pressures has been an active area of research in Raman spectroscopy. Jayaraman, who is well known for his contributions in high pressure Raman studies, presents a review of that research area. It is well known that C. V. Raman had a passion for research on diamonds. Ramdas presents results of their investigations on vibrational and electronic excitations in isotopically-controlled diamonds. Ajay Sood and his coworkers (**page 322**) discuss interference-enhanced Raman spectroscopy studies (IERS). This IERS method is another novel technique developed in the eighties to study ultra thin films. Application of IERS to studying ultra thin germanium films is demonstrated in the article. Finally, the applications of resonance Raman spectroscopy to chemical dynamics have been reviewed with emphasis on the results from our group (**page 328**). In this article, the usefulness of resonance Raman spectroscopy to study structural distortions induced immediately on photoexcitation or absorption of light has been presented with some examples. This technique essentially, albeit in a relative sense, provides information on how much a bond is moving in the first few tens of femtoseconds. I would like to personally call this method of observation as 'Video spectroscopy' for a photoinduced chemical process, since we can watch how the different vibrations or bonds move in real time when a molecule initiates a photochemical process.

These papers are only a small representation of the emerging and modern trends in Raman spectroscopy. There are a number of other areas of Raman spectroscopy like applications in industrial process control and quality control based on the simple fact that Raman spectroscopy is fundamentally a fingerprinting technique which merits mention. Raman imaging is another area of research that is fast developing towards surface and material characterization in paint industries, corrosion studies, forensic sciences, biological cell imaging, etc. The applications of Raman spectroscopy are emerging as fast as the technological development in lasers, optics, detectors, fibers, etc. Raman was remarkably prescient in concluding his 1928 paper (*Indian J. Phys.*, reproduced on **page 382**) with the statement: 'We are obviously only at the fringe of a fascinating new region of experimental research which promises to throw light on diverse problems relating to radiation and wave theory, X-ray optics, atomic and molecular spectra, fluorescence and scattering, thermodynamics and chemistry. It all remains to be worked out'. Had C. V. Raman been alive today, I have no doubt that he would have immensely been satisfied that his effect has developed this far.

S. Umapathy

INDIAN ACADEMY OF SCIENCES

PANEL ON SCIENTIFIC DATA OF PUBLIC INTEREST

The Indian Academy of Sciences is undertaking a detailed study of issues connected with Scientific Data of Public Interest. The objectives of the study are:

1. To access the position in the country regarding archives of scientific data of public interest, in particular on such issues as:

   (i) the availability of data in various fields.
   (ii) the quality of the data so archived, and
   (iii) the adequacy of methods adopted for ensuring requisite standards of data quality.

2. To examine current policies governing access to such data in the light of the need to ensure informed public opinion and encourage value-addition to the acquired data through both public and private enterprise.

3. To recommend such measures as may be necessary to promote the acquisition of data of public interest, the assurance of its quality, and improvement of accessibility to it, through the use of appropriate technology and adoption of suitable policies, without jeopardizing national security interests.

4. To consider all such other matters that would enhance the use and value of scientific data bases of public interest in the country, and ensure use of such data bases to the greatest benefit of the public and of the national scientific effort.

The panel invites comments, suggestions, accounts of personal experience and any other material considered relevant to the terms of reference of the Panel. The material may be sent to either of the addresses below:

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