

Time-Resolved Vibrational Spectroscopy

Published as part of *The Journal of Physical Chemistry virtual special issue "Time-Resolved Vibrational Spectroscopy"*.

The contributions of vibrational spectroscopy, especially to the study of molecular structure and materials characterization was well established during the twentieth century. However, with the advent of time-resolved vibrational spectroscopy (TRVS) in the early 1970s, novel methodologies and tools enabled an experimental basis to extend measurements of static vibrational spectra (e.g., using mainly Raman and Infrared spectroscopies) to the examination of reactive and dynamic species (molecules, radicals, ions, excited electronic states) having lifetimes on the picosecond and longer time scales. TRVS continues to evolve in both the sophistication of the methods and the complexity of the molecular systems now being examined (e.g., enzymes, proteins, polymers, even living cells).

To tie the TRVS community together, Prof. George Atkinson (retired, University of Arizona, Tucson) and his colleagues established a conference forum for members to routinely meet and discuss their findings and work. The first conference was held in 1982 at Lake Placid, NY, with a few dozen conferees and the outlook that more would join in future years. The meeting has met every two years since 1985, rotating among the US, Europe, and Japan until the latest 18th meeting in Cambridge, U.K. (TRVS 2017/XVIII), chaired by Prof. Stephen Meech of The University of East Anglia. TRVS conference planning is overseen by an international advisory committee of about 26 members who independently decide on the chair and locations for upcoming meetings. The number of attendees has grown substantially since the early meetings, with as many as 240 attendees including about 20 invited speakers, 50 contributed talks, and two poster sessions showing about 85 posters. The current list of committee members, meeting history, and locations of prior conferences, the scientific program and other information for TRVS 2017 may be found at www.trvs2017.com.

To promote the state of the art of TRVS following the meeting that was held and chaired by Prof. George Atkinson in Tucson, AZ in 1999, George compiled contributed papers to generate a *Special Issue* in *The Journal of Physical Chemistry A*, which was published in early May 2000. The TRVS conference continues to thrive and grow, and following George's early lead, we now update the *JPC* readership through publication of recent research presented by attendees of TRVS 2017 in this *Virtual Special Issue*.

The articles appearing in this *Virtual Special Issue* of *The Journal of Physical Chemistry A* provide the reader with an opportunity to view the current general scope of the TRVS field and recent strides made to develop new methodologies and their application in a wide variety of research. Much progress can be traced to the rapidly increasing experimental capabilities derived from new and more versatile ultrafast laser systems, the quantitative measurement and interpretation of nonlinear optical phenomena, and advances in multidimensional infrared

and Raman spectroscopies (e.g., 2DIR and FSRS) and theory. The breadth of applications of TRVS methodologies continues to be truly breathtaking. The papers presented in this issue encompass investigations of (i) vibrational dynamics in biological and condensed-phase systems, (ii) photochemical reaction mechanisms in organic and inorganic materials systems, (iii) structural changes and intermediates at interfaces and in ionic and aqueous solution, and (iv) coherent phenomena and theory associated with nonlinear optical and molecular properties. The diversity and sophistication of these papers not only highlights the advances made in recent years by researchers using TRVS techniques but also provides a unique perspective on the scientific horizon accessible to future TRVS practitioners.

We thank all the contributors and reviewers of the articles compiled in this issue for their research prowess, authorship, dedication, and time to make this overview a success. We also thank Profs. Martin Zanni and Anne McCoy of *The Journal of Physical Chemistry* for helping with the detailed arrangements and editing of this *Virtual Special Issue*.

Huib Bakker

Amolf, Amsterdam, The Netherlands

Stephen R. Meech

University of East Anglia, Norwich, U.K.

Edwin J. Heilweil

NIST, Gaithersburg, Maryland, United States

■ ASSOCIATED CONTENT

📄 Supporting Information

The Supporting Information is available free of charge on the ACS Publications website at DOI: 10.1021/acs.jpca.7b12769.

Table of Contents for the *Time-Resolved Vibrational Spectroscopy Virtual Special Issue* (PDF)

Published: May 10, 2018