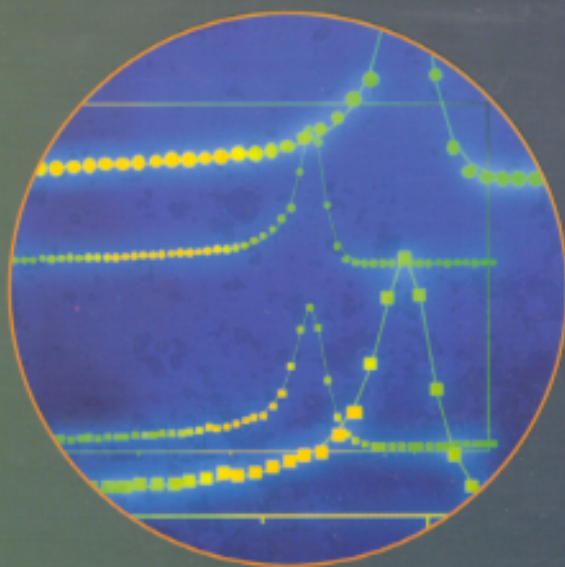


EDITORS
J. M. CHALMERS
P. R. GRIFFITHS



HANDBOOK OF

VIBRATIONAL SPECTROSCOPY

Volume

1

Theory and Instrumentation

 WILEY

Contents

VOLUME 1: THEORY AND INSTRUMENTATION

Introduction to the Theory and Practice of Vibrational Spectroscopy

The Historical Development of Experimental Techniques in Vibrational Spectroscopy	1
<i>N Sheppard</i>	
Introduction to Vibrational Spectroscopy	33
<i>P R Griffiths</i>	
Infrared Spectroscopy: Theory	44
<i>D Steele</i>	
Raman Spectroscopy: Theory	71
<i>G Keresztury</i>	
Optical Constants	88
<i>J E Bertie</i>	
Bandwidths	101
<i>J J Turner</i>	
Mid-infrared Spectroscopy of the Condensed Phase	128
<i>J M Chalmers</i>	
Raman Spectroscopy of the Condensed Phase	141
<i>N J Everall</i>	
High-resolution Fourier Transform Spectrometry of Gases	150
<i>G Guelachvili/N Picqué</i>	
Instrumentation and Methods for High-resolution Gas-phase Spectroscopy	165
<i>D McNaughton</i>	
Raman Spectroscopy of Gases	176
<i>A Weber</i>	
Near-infrared Spectroscopy of Synthetic and Industrial Samples	196
<i>C E Miller</i>	
Near-infrared Spectroscopy of Biomaterials	212
<i>W F McClure/D L Stanfield</i>	
Far-infrared Spectroscopy	229
<i>P R Griffiths</i>	

Instrumentation for Mid- and Far-infrared Spectroscopy

Resolution and Instrument Line Shape Function	241
<i>P R Griffiths</i>	
Monochromators for Mid-infrared Spectroscopy	249
<i>M Ford</i>	
Infrared Filtometers	255
<i>P Wilks</i>	
Continuous Scanning Interferometers for Mid-infrared Spectrometry	264
<i>R S Jackson</i>	
Instrumentation for Step-scan FT-IR Modulation Spectrometry	283
<i>C J Manning</i>	
Polarization Interferometers for Infrared Spectrometry	298
<i>P L Polavarapu</i>	

Diode Laser Spectrometers for Mid-infrared Spectroscopy	304
<i>A W Mantz</i>	
Fabry-Perot Interferometers for Mid-infrared Spectroscopy	316
<i>T Iwata</i>	
Instrumentation for Far-infrared Spectroscopy	326
<i>P R Griffiths/C C Homes</i>	
Incandescent Sources for Mid- and Far-infrared Spectrometry	337
<i>H Buijs</i>	
Synchrotron and Free Electron Laser Sources of Infrared Radiation	341
<i>G P Williams</i>	
Detectors for Mid- and Far-infrared Spectrometry: Selection and Use	349
<i>E Theocharous/J R Birch</i>	
Optical Materials for Infrared Spectroscopy	368
<i>D W Vidrine</i>	

Instrumentation for Near-infrared Spectroscopy

Monochromators for Near-infrared Spectroscopy	383
<i>F A DeThomas/P J Brimmer</i>	
Near-infrared Array Spectrometers	393
<i>E W Stark</i>	
Miniature Spectrometers	423
<i>R V Kruzelecky/A K Ghosh</i>	
Tunable Filter and Discrete Filter Near-infrared Spectrometers	436
<i>D L Wetzel/A J Eilert/J A Sweat</i>	
Hadamard Transform Near-infrared Spectrometers	453
<i>R M Hammaker/R A DeVerse/D J Asunkis/W G Fateley</i>	
Infrared-emitting Diodes for Near-infrared Spectrometry	461
<i>T C Rosenthal</i>	

Instrumentation for Raman Spectroscopy

Raman Monochromators and Polychromators	467
<i>M J Pelletier</i>	
Volume Phase Holographic Optical Elements	482
<i>H Owen</i>	
Continuous Lasers for Raman Spectrometry	490
<i>M-W Pan/R E Benner/L M Smith</i>	
Array Detectors for Raman Spectroscopy	507
<i>C J S Pommier/L K Walton/T D Ridder/M B Denton</i>	
Fourier Transform Near-infrared Raman Spectroscopy	522
<i>D B Chase</i>	
Resonance Raman Spectroscopy	534
<i>J L McHale</i>	
Ultraviolet Raman Spectrometry	557
<i>S A Asher</i>	

Introduction to Nonlinear Raman Spectrometry <i>A M Zheltikov</i>	572	Surface-enhanced Vibrational Spectroscopy	
Coherent Anti-Stokes Raman Spectroscopy <i>L Uji/G H Atkinson</i>	585	Electromagnetic Mechanism of Surface-enhanced Spectroscopy <i>G C Schatz/R P Van Duyne</i>	759
Inverse Raman Spectrometry <i>D Bermejo</i>	596	Surface-enhanced Raman Scattering <i>W Ewen Smith/C Rodger</i>	775
Hyper-Raman Spectroscopy <i>L D Ziegler</i>	611	Surface-enhanced Infrared Absorption Spectroscopy <i>M Osawa</i>	785
Time-resolved Spectroscopy		Other Instrumental Approaches for Vibrational Spectroscopy	
Fast Time-resolved Mid-infrared Spectroscopy Using an Interferometer <i>G D Smith/R A Palmer</i>	625	Sum-frequency Spectroscopy <i>D A Beattie/C D Bain</i>	801
Instrumental Aspects of Time-resolved Spectra Generated Using Step-scan Interferometers <i>C Rödig/F Siebert</i>	641	Inelastic Electron Tunneling Spectroscopy <i>K W Hipps/U Mazur</i>	812
Time-resolved Mid-infrared Spectrometry Using an Asynchronous Fourier Transform Infrared Spectrometer <i>K Masutani</i>	655	High-resolution Electron Energy Loss Spectroscopy <i>M A Chesters</i>	830
Fast Time-resolved Mid-infrared Spectroscopy Using Grating Spectrometers <i>M Hashimoto/T Yuzawa/C Kato/K Iwata/H-o Hamaguchi</i>	666	Inelastic Neutron Scattering Spectroscopy <i>S F Parker</i>	838
Fast and Ultrafast Time-resolved Mid-infrared Spectrometry Using Lasers <i>D C Grills/M W George</i>	677	Two-dimensional Vibrational Spectroscopy by Doubly Vibrationally Enhanced Four-wave Mixing <i>J C Wright/W Zhao/K Murdoch/D Besemann/N Condon/K Meyer</i>	853
Dichroism and Optical Activity in Vibrational Spectroscopy		Infrared Cavity Ringdown Spectroscopy <i>D R Wagner/G P Miller/C B Winstead</i>	866
Linear Dichroism in Infrared Spectroscopy <i>T Buffeteau/M Pézolet</i>	693	Calibration Procedures and Standards for Vibrational Spectroscopy	
Trichroic Infrared Measurements of Orientation <i>J L Koenig</i>	711	Wavenumber Standards for Mid-infrared Spectrometry <i>L M Hanssen/C Zhu</i>	881
Basics of Orientation Measurements in Infrared and Raman Spectroscopy <i>R Ikeda/D B Chase/N J Everall</i>	716	Ordinate Scale Standards for Mid-infrared Spectrometry <i>F J J Clarke</i>	891
Vibrational Circular Dichroism <i>L A Nafie/R K Dukor/T B Freedman</i>	731	Wavenumber Standards for Near-infrared Spectrometry <i>S J Choquette/J C Travis/C Zhu/D L Duewer</i>	899
Raman Optical Activity Spectroscopy <i>W Hug</i>	745	Photometric Standards for Near-infrared Spectrometry <i>A W Springsteen</i>	906
		Wavenumber Standards for Raman Spectrometry <i>M M Carrabba</i>	912
		Photometric Standards for Raman Spectroscopy <i>R L McCreery</i>	920