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Raman Spectroscopy Markets: Global Analysis and Opportunity Evaluation 2016 - 2020

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Abstracts

This market report gives a comprehensive and easy-to-review analysis of the Raman Spectroscopy market 2016 – 2020. It provides key market data and identifies market needs and new and emerging opportunities in the Raman Spectroscopy field.

Use of Raman Spectroscopy

Growth in end-user's Raman Spectroscopy studies now and 3 years (±% change)

High Growth Areas covering techniques, applications now and in 3 years (±% change)

Market Size - Consumables calculated from per-sample costs and throughputs

Life Science, Research and Clinical Applications and key sectors across these field

Instrument Suppliers currently and anticipated the over next 3 years (±% change)

Consumables Suppliers currently and anticipated the over next 3 years (±% change)

Three-Year Plans end-user's plans for using Raman Spectroscopy over the next 3 years

Raman Instruments most cited instruments, currently and next 3 years (±% change)

Fields use of Raman Spectroscopy across 28 fields and over next 3 years (±% change)

Techniques use 20 Raman techniques and anticipated over next 3 years (±% change)

Applications of Raman Spectroscopy across 28 and anticipated in 3 years (±% change)

Raman Systems the major system types used and anticipated in 3 years (±% change)

Hybrid Raman Systems in current use and anticipated in 3 years (±% change)

Raman Wavelength Ranges in current use and anticipated in 3 years (±% change)

Specific Wavelengths in current use and anticipated in 3 years (±% change)

Molecule Types studied currently and anticipated in 3 years (±% change)

Software used by end-user's in their Raman Spectroscopy activities

Innovation and Development Needs relating to the future use of Raman Spectroscopy

Disease Biomarkers types, diseases, purposes, clinical utilities

Sample types analysed analysed now, and anticipated in 3 years (±% change)

Other Areas

Disease biomarker types, disease areas, purposes of studies and clinical utilities

Costs of sample analysis estimated by end users, using Raman Spectroscopy

Average monthly throughput of samples by end users, using Raman Spectroscopy

Countries and global regions

Organisation types

Companies Mentioned

More than 55 companies are mentioned in this report, namely Agilent, AMS Technologies, Andor, Attocube, Avantes BV, Axiom Analytical, B&W Tek, BaySpec, Biotools, Bruker, Coherent, Deltanu (SciAps), EKSMA Optics, EKSPLA, Enhanced Spectroscopy, Enwave Optronics (TSI), Headwall, Horiba, IL Photonics, InPhotonics, Integrated Optics, Jasco products, Jenoptik, Jobin Yvon, Kaiser Optical Systems, Leica, Malvern Instruments, McPherson, MPB, Neal Spec, Nuctech Company, NY-MDT, Ocean Optics, OptiGrate, Optoprim, P&P Optica, Perkin Elmer, Power Technology, Princeton Instruments, Real-Time Analyzers, Renishaw, Rigaku, S&I, Sacher Lasertechnik, SciAps, Semrock, Solar Laser Systems, Specialist Solutions, SpectroLab Systems, Spectroscopic Solutions, Standa, StellerNET, Thermo Scientific, Timegate Instruments, TOPTICA Photonics AG, Wasatch Photonics, Witec and Zolix Instruments products.

This Report

Raman Spectroscopy is a technique used to observe molecular vibrational, rotational, and other low-frequency characteristics. Relying on inelastic scattering (or Raman scattering) of monochromatic light, this technique allows the identification of molecules from the unique fingerprint that Raman-active molecules provide.

This technique has established a unique position among spectroscopic methods and supports important applications in the life science and research fields, and now increasingly in clinically-related areas. Raman Spectroscopy has seen important and exciting advances in the last decade and its use continues to grow as new applications are developed. This report presents the findings of a new global study of Raman Spectroscopy that profiled the laboratory use of this technique across research, life science and clinical sectors.

Biopharm Reports' specialised market studies are designed to assist suppliers and developers to profile current and evolving laboratory market opportunities. All of our studies are carried out through specialist groups of experienced end-users and therefore findings are based on 'real world' market data. By providing new insights and a better understanding of end-user practices, needs and future plans, our studies assist suppliers to sell into these markets, and also support innovation and strategic planning. The following study areas were investigated:

Raman Spectroscopy Market Study

Growth

Based on recent trends in the numbers of samples studied in their laboratories using Raman Spectroscopy, end-user's own estimates of by how much (% increase or % decrease) their laboratory use of Raman Spectroscopy has changed over the last three years. Also, based on current trends in the numbers of samples analysed in their laboratories, end-user's own estimates of by how much (% increase or % decrease) they anticipate their laboratory use of Raman Spectroscopy will change over the next three years.

Raman Instrument Suppliers ++

End-users' current main suppliers of Raman Spectroscopy instruments and those companies they anticipate will be supplying Raman Spectroscopy instruments to their laboratories in three years from now, where the companies++ considered were Achema Pte, AcuTech Scientific, Agilent, Agiltron, AHF analysentechnik, Alchema, AMS Technologies, Andor, AppliTek, Art photonics, Attocube, Avantes BV, Axiom Analytical, B&W Tek, Baltic Scientific Instruments, BaySpec, Biotools, Bruker, Cobalt Light Systems, Coherent, Control Development products, CRAIC Technologies, Deltanu (SciAps), EKSMA Optics, EKSPLA, Enhanced Spectroscopy, Enwave Optronics (TSI), Fibretech Optica, Furukawa Electric, GelAMO, GMP SA, Hanley Measurement & Control, Headwall, Headwall photonics products, Henan Brother Device & Equipment, Heracle, Horiba, IL Photonics, InPhotonics, Integrated Optics, Intevac, IPG Photonics, Iridium Spectra Technologies, IS-Instruments, Jasco products, JenaWirtchaft, Jenoptik, Jovin Yvon, JPK Instruments, Kaiser Optical Systems, Leica, LIOS Technology, LTB Lasertechnik, Malvern Instruments, Manbar Technology, McPherson, Mountain Photonics, MPB, Neal Spec, Northern ANI Solutions, Nuctech Company, NY-MDT, Ocean Optics, OMT, Optical Balzers, OptiGrate, Optoprim, P&P Optica, Pacer, PD-LD, Perkin Elmer, Photo etc, PIKE Technologies, Power Technology, Princeton Instruments,

Process Instruments, Real-Time Analyzers, Renishaw, RgBLase, Rigaku, S&I, Sacher Lasertechnik, SciAps, Semrock, Shanghai Tianxun, Smiths, Snowy Range Instruments, Solar Laser Systems, Soliton, Solvias AG, Specialist Solutions, SpectroLab Systems, Spectroscopic Solutions, Standa, StellerNET, Tec5, Thermo Scientific, Tianjin Keqi High Corporation, Timegate Instruments, TOPTICA Photonics AG, TornadoSpecta Systems, Two Square Science, uLS Microlaser Systems, Verisante, Wasatch Photonics, Witec, Xian Toption Instrument Co., Ltd, Xian Yima Opto-Electrical Technology Co, Zolix Instruments products and others

++ This listing of suppliers may include companies that have been acquired by other companies, changed their names, or moved out of this field and transferred their products to a third party. This is because, in our experience, end-users often refer to original supplier's and product names, even when companies have been acquired, changed their company name, or where a product range is made available through an alternative third party

Raman Instruments

End-users' most cited current main Raman Spectroscopy instruments (and associated suppliers) in their laboratory and the most cited Raman Spectroscopy instruments (and the associated companies) in terms of those instruments they anticipate they will be using in three years from now. Instrument companies and instrument systems included Agiltron Peak Seeker Pro 785, Avalon Instruments RamanStation, B&W Tek i-Raman, B&W Tek Glacier, B&W Tek Voyage, B&W Tek TacticID, BaySpec RamSpec, Bomem Raman MB-154, Bruker Senterra, Bruker 2000, Bruker 100/S, Bruker Equinox55-Fra106S, Bruker IFS, Enwave Optronics EZRaman, Horiba LabRam, Horiba U1000, Horiba Xplora, Horiba iHR320, Horiba Triax, Horiba HR460, Horiba Nano Raman, Horiba Ramanor HG2S, Horiba SPEX 1404, Jasco NRS 3100, Jasco NRS 2000, Jasco NRS 4100, Jasco NRS 7100, Horiba T64000, Horiba Spex 270M, Kaiser Optical Systems HoloSpec, Kaiser Optical Systems HoloLab Series 5000, Kaiser Optical Systems Holoprobe, Kaiser Optical Systems Kaiser WorkStation, Kaiser Optical Systems Raman workstation, Kaiser Optical Systems RXN1, Kromtek FRA/106S, Malvern Instruments G3-ID, McPherson 207, McPherson 2035, Perkin Elmer RamanFlex, Princeton TriVista 777, Princeton LS785, Princeton Pixis400, Princeton Isoplane, Bruker Vertex, Renishaw InVia, Renishaw RA 100, Renishaw RM 1000, Renishaw System 2000, Snowy Range Instruments IM-52 Sierra CBEx, Thermo Scientific DXR, Thermo Scientific 1Nicolet Almega XR, Thermo Scientific Nicolet NXR 9600, US BioSolutions Delta Nu, WITEC Alpha 300, WITEC R300 and WITEC Alpha 500.

Raman Accessories Suppliers ++

End-users' current main suppliers of Raman Spectroscopy accessories and those companies they anticipate will be supplying their Raman Spectroscopy accessories to their laboratories in three years from now, where the companies++ considered were Achema Pte, AcuTech Scientific, Agilent, Agiltron, AHF analysentechnik, Alchema, AMS Technologies, Andor, AppliTek, Art photonics, Attocube, Avantes BV, Axiom Analytical, B&W Tek, Baltic Scientific Instruments, BaySpec, Biotools, Bruker, Cobalt Light Systems, Coherent, Control Development products, CRAIC Technologies, Deltanu (SciAps), EKSMA Optics, EKSPLA, Enhanced Spectroscopy, Enwave Optronics (TSI), Fibretech Optica, Furukawa Electric, GelAMO, GMP SA, Hanley Measurement & Control, Headwall, Headwall photonics products, Henan Brother Device & Equipment, Heracle, Horiba, IL Photonics, InPhotonics, Integrated Optics, Intevac, IPG Photonics, Iridium Spectra Technologies, IS-Instruments, Jasco products, JenaWirtchaft, Jenoptik, Jovin Yvon, JPK Instruments, Kaiser Optical Systems, Leica, LIOS Technology, LTB Lasertechnik, Malvern Instruments, Manbar Technology, McPherson, Mountain Photonics, MPB, Neal Spec, Northern ANI Solutions, Nuctech Company, NY-MDT, Ocean Optics, OMT, Optical Balzers, OptiGrate, Optoprim, P&P Optica, Pacer, PD-LD, Perkin Elmer, Photo etc, PIKE Technologies, Power Technology, Princeton Instruments, Process Instruments, Real-Time Analyzers, Renishaw, RgBLase, Rigaku, S&I, Sacher Lasertechnik, SciAps, Semrock, Shanghai Tianxun, Smiths, Snowy Range Instruments, Solar Laser Systems, Soliton, Solvias AG, Specialist Solutions, SpectroLab Systems, Spectroscopic Solutions, Standa, StellerNET, Tec5, Thermo Scientific, Tianjin Keqi High Corporation, Timegate Instruments, TOPTICA Photonics AG, TornadoSpecta Systems, Two Square Science, uLS Microlaser Systems, Verisante, Wasatch Photonics, Witec, Xian Toption Instrument Co., Ltd, Xian Yima Opto-Electrical Technology Co, Zolix Instruments products and others.

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Market Size (Study Group)

As part of this study, end-users provided details of their Raman spectroscopic per-

sample costs, together with the numbers of Raman analytical runs they carry out on a monthly basis. These data allow an estimate of the annual market size corresponding to the running costs of Raman Spectroscopy, associated with this group of 224 end-users. This is based on an average value of the per-sample costs and an average value for the number of sample runs per month. Purchasers of the Global License for this report are able to analyse these financial figures across all market sectors covered in this study. Also, these financial figures allow companies to estimate Raman 'running cost' market sizes on a global, regional or country-wide basis, from their own independent figures of the associated numbers of Raman Spectroscopy users.

Raman Techniques

End-users' current main Raman Spectroscopy techniques used in their laboratories and those Raman Spectroscopy techniques they anticipate they will be using in their laboratories in three years from now, where the techniques considered were 3D Confocal Raman Imaging, Angle-resolved Raman spectroscopy, Coherent anti-Stokes Raman spectroscopy (CARS), Dispersive Raman Spectroscopy, Fibre Probe Based Raman Spectroscopy, Hyper Raman, Inverse Raman spectroscopy, Micro-Cavity Substrates, Optical tweezers Raman spectroscopy (OTRS), Raman optical activity (ROA), Raman Spectra Flow Cytometry, Resonance Raman spectroscopy, Spatially Offset Raman Spectrometry (SORS), Spontaneous Raman spectroscopy (SRS), Stand-off Remote Raman, Stimulated Raman spectroscopy, Surface Plasmon Polariton Enhanced Raman scattering (SPPERS), Surface-Enhanced Raman spectroscopy (SERS), Time Resolved Resonance Raman (TR3) Spectroscopy, Tip-Enhanced Raman Spectroscopy (TERS), Transmission Raman Spectroscopy (TRS) and others.

Raman Applications

End-users' current main applications of Raman Spectroscopy across 28 fields and those applications they anticipate they will be using in three years from now across the same 28 fields:

Airport Security: Counterfeit products, Explosive materials (e.g. TATP, TNT), Hazardous substances, Narcotics or precursors, Screening for liquids, gels or powders, Testing through containers, Toxic chemicals and others;

Archaeology: Architectural materials, Biomaterials, Fabrics and textiles, Gems, Glass and ceramics, Manuscripts, Metals and corrosion products, Paintings and others;

Art & Restoration: Archaeometric analysis of ancient pottery, Identification of artworks, Identification of used materials, Non-destructive analysis of pigments, Protection of Artworks, Proof of the authenticity, Study of degradation and aging, Study of preservation and others;

Biological: Cell membranes, Cell surface proteins, Cellular microanalysis, Conformation or secondary structure of a macromolecule, Disease characterization, Hydrogen bonding, General macromolecules, biopoymers, Polynucleotides and nucleic acids, Proteins, SERS Intracellular structures and analytes, Surface structure of cells, Tissues and others;

Biomedical: Calcification processes in tissues, Characterisation of bone beneath skin, Tissue interface (diseased and healthy), Tissue scaffold analysis and others.

Chemicals: Catalysis, Chemical product analysis, Impurities identification, Incoming materials inspection/certification, Purity analysis, Quality control, Reactions and kinetics and others;

Cosmetics: Additives, Contaminants, Incoming materials analysis, Product analysis and others;

Food & Feeds: Additives, Alcohol containing products, Contaminants, Emulsions, Flavours, Food contaminants including bacteria, antibiotics, dyes, Food freshness, food inspection, food production, Food quality, Ingredients and others;

Food Safety & Agriculture: Food contaminants, Food freshness, Food inspection, Food quality and others;

Forensics: Analysis of counterfeit documents, Counterfeiting, Crime scene specimens (e.g. fibres, liquids etc)., Detection of explosives, Identification of street drugs, Illicit drug analysis, Money and others;

Gemology: Anti-counterfeiting of gemstones, Distinguishing natural and synthetic, Fluid inclusion in garnets, Identification of gemstones, Inclusions and adulterants, Isomorphs and subspecies, Origins of gemstones and others;

Geology: Geological materials, Inclusions e.g. liquids, Chemical analysis, Origins of samples, Sample heterogeneity and others; and others;

Life sciences: Bacteria, Cells, Chiral Molecules, Chromosomes, Conformation Analysis, Kinetics Studies, Membranes, Metalloproteins, Nuclei, Proteins, Other macromolecules, Single biomolecules, Structural proteomics, Surface structure of cells, Tertiary chemical structure (e.g. disulphide bonds), Tissues, Viruses and others;

Medical diagnostics: Bacteria, Biomarkers, Biopsies, Blood analysis, Cytology, Drug efficacy studies, Fungal, Histopathology, Surgical targets, Tissue interface, Tissues, Treatment monitoring, Viruses and others;

Mineralogy: Characterization, Chemical variation, Component analysis and quantification, Identification, Internal solid and gas-liquid inclusions, Mineral origins, Mineral quality or heterogeneity, Mineral treatments, Surface inclusion, Topographic analysis and others.

Nanotechnology: Additives, Analysis, Contaminants, Inclusions, Nanoscale Identification, Quality analysis, Structural analysis, Surfaces, Other and.

Oil & Gas: Analysis and quantification, Chemical components, Contaminants, Gas products, Monitoring treatments, Oil products, Other and.

Online Monitoring: Containerised, Continuous monitoring, Difficult to access materials, Flowing or moving, In-solutions analysis, Quantitative analysis, Through glass analysis, Through plastics analysis, Within tubing analysis, Other and.

Perfumes: Essential oils, Product quality, Product stability, Production, Pure fragrances, Raw materials, Starting chemicals and others.

Petrochemicals: Additives, oxygenates, Blending processes, Boiler feed and condensate return, Cooling water, Diesel fuel composition, Mixtures of hydrocarbons, Octane number, Petroleum products (gasoline, kerosene, diesel fuel), Presence of sulphur additives, Process liquids, Stack gases, Taggants and others.

Pharmaceuticals: Analysis of finished product, Bioanalysis, Breakdown products, Capsules, Compliance requirements, Contaminants, Content analysis of tablets, liquids etc, Content Uniformity, Drugs inspection and certification, Emulsions, Formulation Development, High-throughput screening in drug discovery, Identification of counterfeit pharmaceuticals, Identification of drug co-crystals, Identification of particles, Identification of products, Imaging, layered materials, Liquids, Manufacturing, Materials identification (APIs), Ointments, Polymorphs identification and classification, Powder

blend monitoring, Product liability, Production costs, Quality control, Raw materials identification, Real-time monitoring, Stability studies, Tablet and powder forms and others.

Polymers: Additives, Analysis of multilayer systems, Antioxidants, Blends, Characterization of polymers (crystallinity, density, conformation etc), Contaminants, Copolymers, Determination of monomer content, fillers, additives, Failure analysis (identification of impurities and inclusions), Flame retardants, Monitoring polymerizations, Monitoring the reaction process of liquids, Polymer Identification, Polymer laminates, Polymer stability, Quality control, Raw materials, Recycling and others. others.

Process Control: Failsafe systems, Finished products, Materials identification, Process monitoring, Raw materials, System dynamics or kinetics and others.

Quality Control: Additives, Contaminants, Finished products, Processes, Quality grading, Stability, Starting materials and others.

Safety: Contaminants, Hazards, Risks, Stability, Suitability for purpose and others.

Security: Customs and other checkpoints, Goods checks at outlets, Hazardous or high-risk materials, Military and hot zones, Narcotic traffic, Post-blast examination and others.

Semiconductors: Alloy composition, Characterization of particulates on semiconductors, Chemical and physical characteristics., Composition of layers, Control of optical behavior, Control the electrical behavior, Crystalline properties of such device structures., GE content, Growth processes, Imaging of silicon stress in microelectronics, Strain of the layers, Wafer structure and damage and others.

Water: Analysis of analytes, Contaminant analysis, Continuous monitoring, Quality analysis and others.

Raman Software

End-users' current main Raman Spectroscopy software types used in their studies. Software companies included Analytik, Andor, Bruker, Camo, Cytospec, Eigenvector, Enwave, Horiba, In-House, Lumerical, Mathworks, NOAO, Not Indicated, Open Source, Origin Lab, Perkin Elmer, Princeton Instruments, Renishaw, Snowy Range Instruments,

SPSS Inc, Thermo Scientific, Umetrics and Witec. Software types included Andor Solis, Astronomical, CytoSpec, FDTD, Fityk, Galactic Spectraview, Gaussian, Grams, Holograms, In-House, IRAF, LabRam Software, LabSpec, LabView, Ligh Field, Matlab, MIA Toolbox, Nuspec, Omnic, Opus, Origin, Peak, PeakFit, PLS Toolbox, Prism, R, RamanToolSet, Simca, Spectrum, SPSS, Unscrambler, WinSpec and Wire.

Innovation and Development Needs

Based on their own experience, end-users' views on the areas of greatest need for innovation or development, in Raman Spectroscopy.

Costs

End user's estimates of the average costs of their Raman Spectroscopy analyses for a typical study sample in their laboratory, where the cost levels considered were $5000.

Throughput

End user's estimates of the average number of study samples they analyse each month using Raman Spectroscopy in their laboratory, where the throughput levels considered were 2500.

Fields

End-users' current main fields of use of Raman Spectroscopy and those main fields of use of Raman Spectroscopy they anticipate in three years from now, where the fields considered were Airport Security, Archaeology, Art & Restoration, Biological, Biomedical, Chemicals, Cosmetics, Food & Feeds, Food Safety & Agriculture, Forensics, Gemology, Geology, Life Sciences, Medical Diagnostics, Mineralogy, Nanotechnology, Oil & Gas, Online Monitoring, Perfumes, Petrochemicals, Pharmaceuticals, Polymers, Process Control, Quality Control, Safety, Security, Semiconductors, Water and Other.

Raman Systems

End-user's current Raman Spectroscopy systems and those Raman Spectroscopy they anticipate they will be using in their laboratories in three years from now, where the systems considered were Microscopes, Benchtop Raman Spectrophotometers, Hand-Held Raman Spectrophotometers and any other.

Raman Hybrids

End-user's current Raman Spectroscopy hybrid systems and those Raman Spectroscopy hybrids they anticipate they will be using in their laboratories in three years from now, where the hybrids considered were Raman and Atomic Force Microscopy (AFM), Raman and Fluorescence Microscopy, Raman and Luminescence Imaging, Raman and Nearfield microscopy (SNOM), Raman and Optical Coherence Tomography (OCT), Raman and Fourier transform infrared spectroscopy (FTIR), Raman and Confocal laser scanning microscope (CLSM), None used or any other.

Raman Wavelength Ranges

End-user's current Raman Spectroscopy wavelength range and those Raman Spectroscopy ranges they anticipate they will be using in their laboratories in three years from now, where the ranges considered were Ultra Violet, Visible, Near Infra Red or other.

Raman Wavelengths

End-user's current Raman Spectroscopy wavelengths and those Raman Spectroscopy wavelengths they anticipate they will be using in their laboratories in three years from now, where the wavelengths considered were Ultra-violet 244 nm, Ultra-violet 257 nm, Ultra-violet 325 nm, Ultra-violet 364 nm, Ultra-violet Other nm, Visible 457 nm, Visible 473 nm, Visible 488 nm, Visible 514 nm, Visible 532 nm, Visible 633 nm, Visible 660 nm, Visible Other nm, Near infra-red 785 nm, Near infra-red 830 nm, Near infra-red 980 nm, Near infra-red 1064 nm, Near infra-red Other nm and other.

Molecules Types

End-user's current molecule types studied Raman Spectroscopy and those molecule types they anticipate studying using Raman Spectroscopy in three years from now.

Disease Biomarkers

End-users use of Raman Spectroscopy to study disease biomarkers, where the options considered were 'yes' or 'no'. Also, for those who indicated 'no' to the previous questions, whether they expect to be studying disease biomarkers in three years from now, where the options were 'yes', 'no' or 'not sure'.

Biomarker types studied using Raman spectroscopy, where the options considered were Genetic molecules (e.g. DNA, mRNA, MicroRNA etc.), Non-genetic molecules (e.g. proteins, metabolites), Structural images, Intracellular images, Cell-surface images, Tissue images, Tissue/Cellular interfaces or any other.

The disease areas to which their Raman disease biomarker activities relate, where the diseases considered were Arthritis, Autoimmune Diseases, Bone Metabolism, Cancer, Cardiovascular, Central Nervous System, Dentistry, Dermatology, Endocrine, Gastrointestinal, Genito-urinary System, Haematology, Infections, Inflammation, Metabolic Disorders, Musculoskeletal Disorders, Nutrition, Obstetrics and Gynaecology, Ophthalmology, Pain, Psychiatry, Respiratory, Skin, any other or None.

The purpose of their raman disease biomarker studies, where the purposes considered were Biomarker Discovery, Clinical – Research, Clinical – Trials, Diagnostics – Screening, Diagnostics – Research, Diagnostics – Routine tests, Disease research, Drug R&D – Clinical trials, Drug R&D – Drug targets, Drug R&D – Preclinical, Drug R&D – ADME, Toxicology, Treatment – Decisions, Treatment – Monitoring or any other.

The clinical utility of their disease biomarker studies, where the options considered were Companion diagnostics, Disease prognosis, Disease stage or severity, Disease susceptibility or risk, Disease variability, Drug discovery, Drug therapy dose, Early detection of disease, Guiding treatment, Multiple utilities, Response to therapy, Safety or toxicity factors, Screening and monitoring, Therapy decision-making or other.

Samples

End-users' current main sample types analysed using Raman Spectroscopy in their laboratories and those sample types they anticipate analysing using Raman Spectroscopy in their laboratories in three years from now, where the sample types considered were Biological materials, Biological surfaces, Cells, Gases, Gas-liquid phases, Glass, Liquids, Liquid-solid phases, Packaging, Plastics, Powders, Solids, Surfaces, Tissues or any other.

Participants

Organisation Types: Raman Spectroscopy end-user's organisation type, where the options were Clinic, Government Organisation, Hospital, Large International Company, Medium Sized Company, Research Institute, Small Company, Teaching Hospital,

University, Veterinary Organisation or other.

Experience: End-users' years of experience using Raman Spectroscopy

Job Title: End-user's job title, role and main activities.

Countries and Regions: Raman Spectroscopy end-user's countries and global regions; Asia, North America, South America, Africa (Sub-Saharan), Central America/Caribbean, Australia, New Zealand and Oceania and Middle East/North Africa/and Greater Arabia.

Participants: Names and organisations.

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