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UNIQUE SELLING POINTS

RAMANtouch

1. FAST RAMAN MEASUREMENT
   a. The system can measure Raman images faster than 1330 spectra/second
      Remark: The ability to perform imaging is a core capability of a Raman microscope. This value should be demonstrated on real samples, not just theoretical speeds. RAMANtouch's line scan Raman imaging technique is the fastest spontaneous Raman imaging technique on the market.
   b. The system can measure Raman images in the entire field-of-view without moving the sample stage and has a smallest XY step size of 10nm.
      Remark: The capacity to acquire Raman images without displacing the stage brings distinct advantages in scenarios involving heavy samples, test chambers, mechanically unstable samples, and the like. This facilitates enhanced ease of sample handling, along with reduced XY step size and a more malleable measurement sequence, such as Random Scan.
   c. The system can collect average spectrum of a large area up to 1.5 × 1.5mm with homogeneously distributed laser power. (requires 5x objective lens and AreaFlash software package)
      Remark: For heterogeneous or large-scale samples (e.g., wafers or battery materials), general point-mapping is time-consuming and risks missing key phases between points. The AreaFlash technology ensuring statistically meaningful data. This is a gamechanger for industrial QC and fast screening.
2. RANDOM-SCAN RAMAN IMAGING
   The system has the capacity to measure Raman images in a non-sequential manner, with the ability to continuously adjust the measurement order based on the results in order to prioritize the informative part.
   Remark: Traditional mapping wastes time scanning "empty" or background areas. This smart, non-sequential imaging functions like a human expert—identifying ROI (Region of Interest) on the fly and prioritizing informative areas. It drastically shortens experimental time. It should be noted that this method is only achievable with a system that can measure Raman images without moving the sample stage.
3. LASER POWER
   a. The system can regulate the current of the laser for adjusting laser output power. The system is equipped with an adjustable ND filter able to attenuate the laser to 0.01% of its output power. The adjustment of the ND filter has not less than 200 steps.
      Remark: Fine-tuning laser power is critical to prevent delicate samples (like biological tissues) from burning. A continuous 200-step adjustment provides the ultimate precision needed to find the exact threshold between maximum signal and sample damage.
   b. The system incorporates a built-in power meter that quantifies laser power at the sample in real time.
      *Remark: Laser power at the sample stage in real time helps the users to guarantee data reproducibility and publication-grade consi*stency day after day, regardless of systematic fluctuations.

4. SPECTROMETER
   a. The system is equipped with a dispersive spectrograph. The focal length of the spectrograph is longer than or equal to 550 mm.
      Remark: Focal length of a spectrometer is the physical foundation of high spectral resolution. A long focal length (550 mm) ensures that stress/strain analysis and close-lying polymorphs can be clearly resolved without sacrificing signal throughput. Short-focal-length benchtop systems cannot compete at this level of detail.
   b. The spectrometer is built into the Raman microscope, not attached to an external one.
      Remark: An integrated, monolithically designed system ensures maximum mechanical stability and a much smaller laboratory footprint.
   c. The laboratory footprint of the system is not success 1*1meter.
      Remark: A compact laboratory design offers distinct advantages, including enhanced flexibility in planning, which is beneficial for users.
5. AUTO-ALIGNMENT
   The system has motorized mirrors in the optical path and an automatic alignment function optimizing the throughput and confocality of the measurement.
   Remark: Over time, every Raman spectrometer loses a fraction of its throughput. Instead of calling a service engineer for manual fine tuning, the motorized auto-alignment feature optimizes the internal mirrors at the click of a button, ensuring the system always operates at peak optical throughput and maximum confocality.
6. CCD
   The system contains a TE cooled, back-illuminated, deep depletion CCD Raman detector. The CCD detector has at least 1340 × 400 pixels, and the imaging area of the CCD detector is not smaller than 26.8 × 8 mm. Maximum quantum efficiency 98%.
   Remark: A large-area deep-depletion CCD maximizes both the large spectral range and the high quantum efficiency. The 400-pixel vertical height is specifically optimized for high-speed line-scanning.
7. AUTOMATED SWITCHING BETWEEN OPTICAL MICROSCOPE AND RAMAN
   The switching between optical microscopy and Raman measurement is performed via software without the need for manual intervention.
   Remark: Eliminating manual operation prevents human error and enables seamless automated workflows.
8. CONFOCAL MICROSCOPY
   The Raman microscope is equipped with confocal mode, enabling the measurement of samples with confocal pinholes and slits of varying sizes. The transition between these two settings is automated and regulated by software.
   Remark: A true physical confocal pinhole is critical for a Raman microscope because it physically blocks out-of-focus background noise and fluorescence, ensuring maximum spatial resolution and precise 3D depth profiling. Unlike WITec's fiber-optic approach (which is limited by fixed fiber core diameters) or Renishaw's digital pinhole (which processes data on the CCD and cannot prevent cross-talk on detector), a physical pinhole optimizes the true optical confocality before the signal reaches the detector.
9. AUTOMATED WAVELENGTH SWITCHING
   The switch between excitation lasers and optical gratings is facilitated by software, thereby eliminating the requirement for manual intervention.
   Remark: Multi-laser systems often suffer from tedious reconfiguration times. Full software automation allows users to switch excitation wavelengths (e.g., from 532nm to 785nm) with a single click.
10. AUTOMATED WAVELENGTH CALIBRATION
    The system incorporates automatic calibration functions that use an internal Ne lamp and a silicon wafer standard. This means that the objective lens does not need to be replaced and an external standard material does not need to be adopted.
    Remark: Traditional calibration forces the user to manually switch to a specific objective lens, place a silicon wafer, and calibrate. An internal, automated mechanism calibrates the system's absolute wavelength (Neon lamp) and relative Raman shift (Si wafer) behind the scenes without touching the sample or changing lenses, ensuring absolute wavenumber accuracy with zero user effort.
11. INTERNAL REFERENCE (Optional)
    The system incorporates internal samples of quartz and can measure conventional samples and the internal reference samples concurrently. The software can display the position differences of the Raman peaks from the measured sample and the internal reference sample in real time (R270-P is required).
    Remark: Subtle spectral drift may be attributed to various factors during large-area mappings. The system calibration precision is maintained at the 0.1 cm^{-1} level through recalibration during measurement with Si and a neon lamp. R270-P has been developed to correct even the slightest drift in real time to the 0.02 cm^{-1} level. This is achieved by recording the internal quartz reference simultaneously with the sample. The system is thus enabled to detect subtle spectral drift of Raman peaks in applications such as wafer stress monitoring.

12. TEMPERATURE STABILITY

    The body of the Raman microscope is maintained at a constant temperature of 33°C, thereby ensuring optimal stability for all optical, mechanical and electrical components.

    Remark: Lab temperatures fluctuate when air conditioning kicks on and off, causing mechanical expansion/ contraction that ruins sub-micron alignments. Maintaining the entire microscope chassis at a constant 33°C isolates the optics from the room environment, providing unparalleled long-term stability and eliminating the need for frequent recalibrations.

13. MOTORIZED NOSEPIECE (Optional)

    The system is equipped with a motorized nosepiece, enabling seamless switching between objective lenses, both automatically via software and manually.

    Remark: Eliminating manual operation prevents human error and enables seamless automated workflows.

14. MICROSCOPY FOV

    The field-of-view of the microscope can reach 100*75µm when using a 100x objective lens.

    Remark: High-magnification lenses like 100x often suffer from tunnel-vision FOVs. A large FOV allows users to visualize and contextualize large structure features without losing the advantage of high numerical aperture (NA) imaging. The FOV of other objective lenses can be derived accordingly to their magnification power.

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