The NanoRam Hand-held Raman Spectrometer: Ideally-suited for the Inspection of Raw Materials and Chemicals Used in the Pharmaceutical industry

In recent years, Raman Spectroscopy has gained a reputation in market segments that require the rapid identification of unknown compounds, such as the testing of chemicals, measurement of pharmaceutical ingredients and characterization of polymers. The reasons behind this surge of interest, is that modern Raman instrumentation using intelligent chemometric software and on-board spectral libraries, is an ideal technique for molecular fingerprinting purposes. Unlike traditional analytical techniques like HPLC, FTIR and NIR spectroscopy, which require more exhaustive sample preparation procedures, Raman equipment can be used in a production environment or for field applications because it requires virtually no sample pre-treatment, no direct contact with the sample, and has the unique capability of being able to test a sample directly through a transparent packing material like glass or plastic. The rapid growth in Raman applications has been accelerated by a number of breakthrough technological advances. Some of these include:

- High quality lasers with a narrow bandwidth of the analytical wavelength of interest
- High spectral resolution optics in order to reduce the impact of interferences
- Charge-coupled device (CCD) detector technology with thermoelectric cooling (TEC) in order to reduce signal noise and increase the dynamic range for lower detection capability
- Miniaturized, high speed integrated computers, offering unprecedented data processing and calculation capability in a very small package

Furthermore, modern Raman instrumentation is faster, more rugged, and less expensive than previous designs. In addition, the advances in component miniaturization have led to the design of high performance, portable, handheld Raman devices. These features in particular have exposed the technology to new application areas that were previously not possible with older, larger and more cumbersome technology. For example, handheld Raman instruments are very well-suited for pharmaceutical manufacturing applications such as the testing of raw materials, due to the technique's extremely high molecular selectivity.

One of the most accomplished of these hand-held Raman spectrometers for this type of application is the NanoRam™ (B&W Tek, Newark, DE). The NanoRam is a state-of-the-art, compact Raman handheld spectrometer and integrated computing system for material identification and verification within cGMP (current Good Manufacturing Practices) compliant facilities, designed specifically for novice and inexperienced users. Weighing less than 2.2lbs, it allows rapid development of standardized and validated methods to facilitate inspection for purity and quality purposes, making it the ideal choice for pharmaceutical, chemical, and mineral characterization, whether it's being used in the lab, at the production line, around the warehouse, on the loading dock or outside for field applications.

The instrument comes operational with B&W Tek's proprietary NanoRam OS software, that is compliant with both cGMP and 21CFR part 11certification. For applications that are more complex or analyses that are quantitative in nature, intelligent chemometrics software packages and other software development kits (SDKs) are available.

Another key benefit is the instrument's unique synchronization capabilities within a network, to wirelessly communicate in real time with a company's Enterprise Resource Planning (ERP) and/or Quality Management System (QMS) software platform. This allows the users to keep their devices updated with spectral libraries and reporting templates at any time with total security and data integrity. In addition, B&W Tek offers complete IQ/OQ (Installation Qualification/Operational Qualification) services to all users of the equipment, as well as customized training, including the optimization of analytical methodology required for their specific applications.

At the heart of the NanoRam is a temperature controlled detector, providing superior data quality and unprecedented system stability. Coupling this proprietary thermoelectric cooling with patented CleanLaze® laser stabilization technology and a high speed micro-processor, it provides laboratory grade performance in the palm of your hand. This kind of performance delivers a signal of the highest quality, reducing the need for repeated testing of the material, which saves time, decreases production costs and enhances productivity.