

SciAps ApNotes

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A series of how-to's and best practices for field and laboratory analytical measurement. More ApNotes available at sciaps.com/apnotes

PLASTICS AND POLYMERS

Instant Verification of High Performance Medical Device and Surgical Tool Plastics



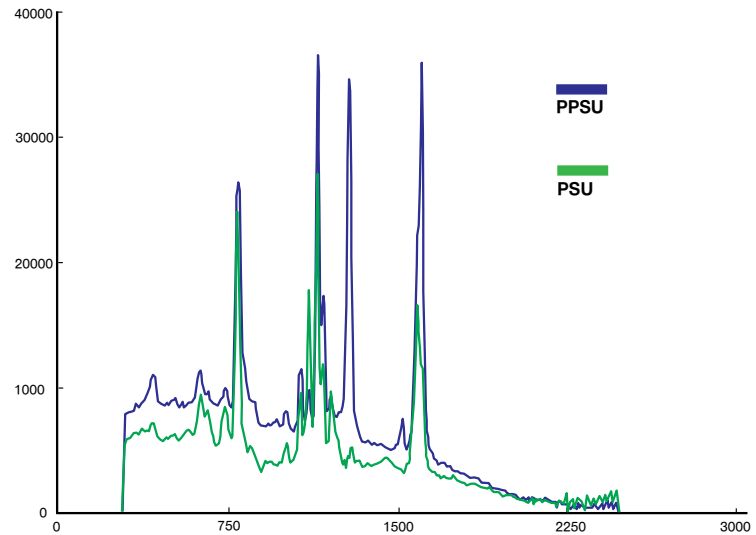
- ^ The Inspector 500 features a unique 1030 nm laser source - essential for reliable verification of the many grades of high performance polymers. Why 1030 nm? It neutralizes the high fluorescence background that plagues more conventional 785 nm Raman analyzers.

High performance plastics are commonplace for medical devices, surgical instruments, and other equipment requiring frequent autoclaving. Plastics in these industries must withstand repeated sterilization cycles without loss of integrity for the device. At the same time, supply chains for these raw materials or fabricated components have become globalized, making a material mix-up more likely and more costly.



Many surgical instruments and food industry equipment utilize either PPSU (Polyphenylsufone or Polysulfone (PSU), due to their unique ability to withstand extremely high temperatures during repeated autoclaving cycles. However, with the requirement for expensive, specialized plastics also comes the opportunity for out-of-spec substitutes, or material mix-ups. One implant manufacturer decided to use a SciAps Raman analyzer to differentiate only between Ultra-High Molecular Weight Polyethylene (UHMWPE) and Polyetheretherketone (PEEK), which can be easily confused on the manufacturing floor due to their similar look and feel.

How does it work? SciAps handheld Raman analyzers are an easy to use, entirely non-destructive technique for verifying polymers. The Raman unit stores molecular signatures or “fingerprints” of common plastics in onboard libraries. Laser light from the instrument directed onto an unknown polymer causes unique molecular vibrational patterns that then re-direct or “scatter” photons back into the instrument at different frequencies to produce a unique “fingerprint” for each polymer. An onboard detection system and processor analyzes the fingerprint, searches it’s on-board library to find a match and displays the correct polymer type for the sample. The analyzers are highly customizable - users can easily add new fingerprints for new or proprietary materials, without sharing any such data or samples with SciAps.



Raman spectra for PSU and PPSU from an Inspector 500 are shown above. The “fingerprints” from the two different plastics clearly show different peak structures, both in location and intensity. Thus, the SciAps analyzer can definitively verify these materials despite their similar molecular structure.



Advanced Design & A Superior User Experience

The Inspector class Raman analyzers maintain the best ergonomics of any handheld Raman. Carefully designed for all end-users - large hands or small, male or female - Inspector is tapered, well-balanced, and equipped with a well-placed wrist strap. It's far easier to use than competing "brick shaped" analyzers that usually require two hands.

Best Ergonomics

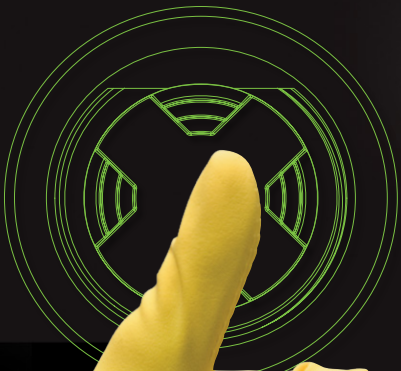
OPERATION
ONE HANDED



Wearing Gloves? We've Re-Invented the Wheel.

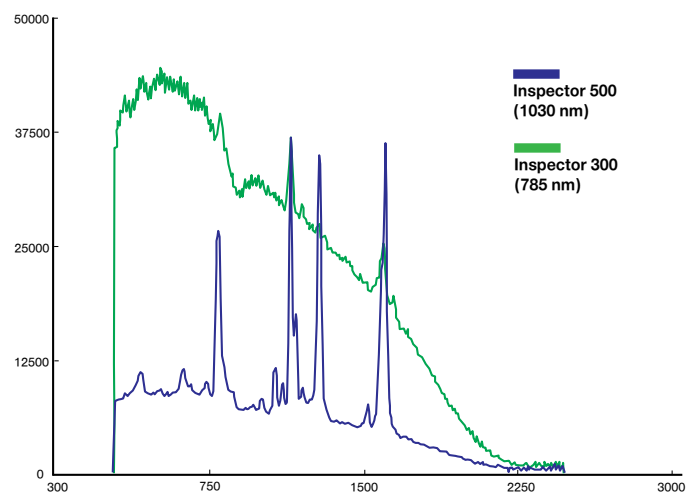
The Inspector is the perfect analyzer for you. It features a bright, color touchscreen with intuitive, icon-driven operation. If you're wearing protective handgear, most touchscreens become difficult to operate. Our unique thumbwheel drive is within easy reach, allowing full analyzer control without ever removing your gloves.

All Thumbs?



SciAps Inspector 500: The Fluorescence Beater

Some high performance plastics cannot be analyzed with the common 785 nm Raman laser. At that wavelength compounds in the material produce high fluorescence, resulting in a high featureless background that obscures the characteristic Raman peaks. One example is shown at right where PPSU is tested at both wavelengths. The 1030 nm laser utilized in the Inspector 500 reveals a clear spectral pattern allowing for highly confident material verification. Contrast this with a nearly featureless spectrum from the 785 nm laser. The 1030 nm laser provides reliable identification, day in and day out, of high performance plastics.



Raman spectra for PPSU from the Inspector 300 (785 nm) and Inspector 500 (1030 nm).

Analyze More Materials with Inspector 500 from SciAps

The Inspector 500 is the newest generation handheld Raman analyzer. It's the world's first SWIR Raman handheld analyzer in a watertight, dustproof package. SWIR Raman, (Short-Wave Infra-Red) refers to the 1030 nm wavelength laser used in the Inspector 500 Raman analyzer. This laser has the unique capability to suppress fluorescence, thereby allowing many more compounds to be analyzed. Unlike 1064 nm models, it consumes much lower power and can be sealed against moisture and dust. Wash it or dunk it to avoid sample contamination or cross contamination. No other portable Raman comes close to this level of analysis power, environmental ruggedness and ergonomic ease.



Did you know? Another Raman Benefit:

Raman spectroscopy is a non-destructive technique and has the ability to test samples through transparent packaging material. That means no unwrapping or sacrificing samples as part of the testing process. Thus, a far greater number of product samples can be verified, greatly reducing the possibility of a mixed or substituted batch of material in the production line.



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