

# Transmission Raman Accessory

Raman Products Technical Note

Number 1353

## Key Issues

- **Transmission Raman measurements**
- **Easy upgrade for existing RAMAN WORKSTATION analyzers**
- **Single measurement or automated multiple sample measurements**

## Introduction

In final quality control / quality assurance applications there is a need to measure materials *non-invasively*. For pharmaceutical materials in the case of tablets or gel capsules, these non-invasive measurements may focus on chemical composition. Raman spectroscopy is a powerful tool for chemical analysis. However traditional Raman measurements using backscatter geometry are limited to studies of surfaces or surface layers. Recent developments have allowed Raman fiber-optic probes to be produced which can probe solid samples down to depths of millimeters. However because the sample geometry is still backscatter, a significant surface signal is still collected. Recent developments, first published in the 2006/2007 timeframe, have shown that with current technology transmission Raman spectroscopy is possible. This note concerns the first commercial Raman transmission accessory.

## Design

The Raman transmission accessory (Figure 1) can be retrofitted to all **RAMAN WORKSTATION™** Raman analyzers.



Figure 1. Transmission accessory option for the **RAMAN WORKSTATION™** Raman analyzer.

The accessory is installed in the position that would accommodate a standard white light transmission condenser (Figure 2).

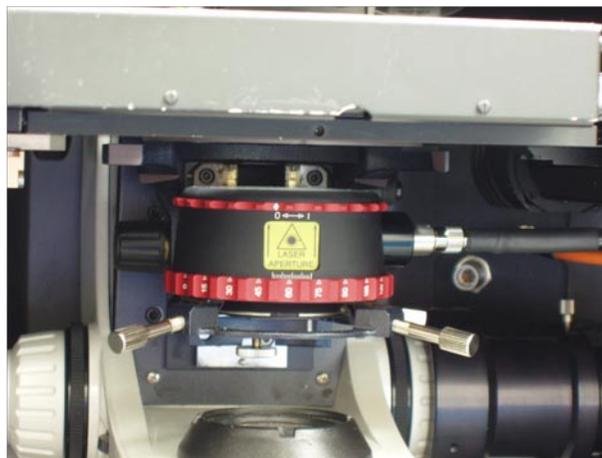


Figure 2. Installed transmission accessory replaces standard transmission white light condenser.

The excitation radiation is coupled to the transmission Raman accessory using a fiber-optic cable. The accessory allows the user to vary the spot size at the sample thus optimizing the illumination characteristics for a variety of different sized samples. In addition the accessory contains a manual laser safety shutter.

## Analyzer Compatibility

The transmission Raman accessory is compatible with all **RAMAN WORKSTATION™** Raman accessories with minimal modifications. Contact Kaiser's service team to prepare the analyzer enclosure and install the accessory.

## Accessory Operation

The transmission accessory may be used for the analysis of individual samples or can be used in conjunction with the **RAMAN WORKSTATION™** Raman analyzer's automated tablet plate. Using the tablet plate up to 24 tablets or gel capsules can be analyzed without individual operator attention (Figure 3).

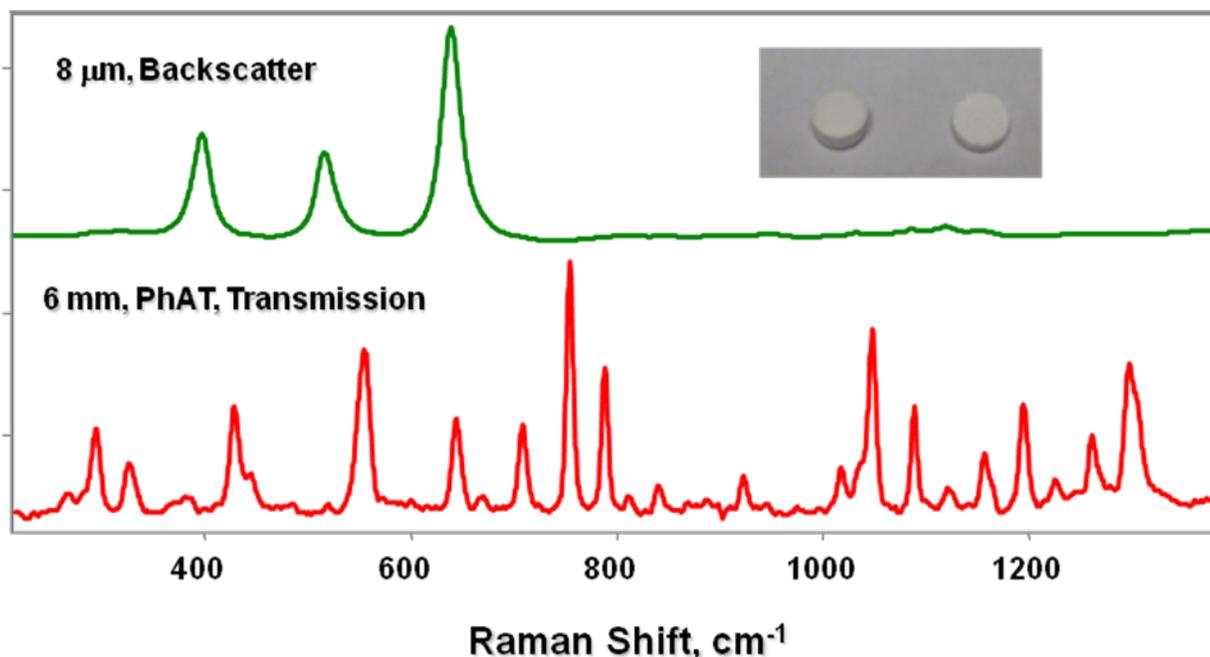


**Figure 3.** 24 tablet plate for the **RAMAN WORKSTATION™** Raman analyzer.

spectrum is dominated by the Raman spectrum of the coating material: titanium dioxide. The transmission spectrum, however, is dominated by bands originating from the bulk aspirin as well as other bulk constituents such as calcium carbonate. The ability to measure a representative spectrum of the bulk of the finish tablet, both *non-invasively* and non-destructively demonstrates the potential for Raman transmission for quality control and quality assurance applications within the pharmaceutical industry. Other industries that could benefit from transmission Raman analysis include polymers, olefins, and specialty chemical.

### Applications Example

An example of the use of transmission Raman analysis compared to conventional Raman microscopy for the study of tablets is shown in Figure 4. The backscatter (conventional Raman microscope)



**Figure 4.** Comparison of Raman sampling geometries for a buffered aspirin tablet.

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