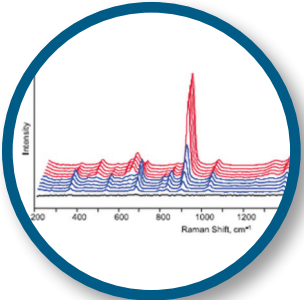
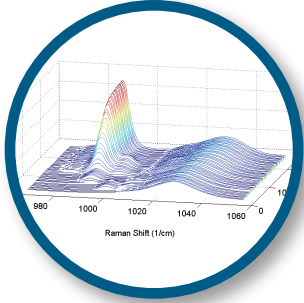


RAMANRXN1™ Instrument



The **RAMANRXN1™** instrument represents Kaiser's analyzer for research. Raman spectroscopy provides the chemical specificity of a mid-IR analyzer with the ease of sampling of a near-IR analyzer. The Raman spectrum contains features that are ideal for fast qualitative and robust quantitative analyses, often without the need for multivariate techniques. The sharp Raman peaks can often be interpreted in terms of individual chemical moieties, thus providing an insight into the chemistry of a reaction and the extent of reaction progress.

This instrument is a simple to use, compact, turn-key Raman spectrometer system that incorporates the laser, spectrograph, and CCD in a compact base module. The **RAMANRXN1™** instrument is based on Kaiser's award winning f/1.8 axial transmissive spectrograph. The f/1.8 design is optically efficient and allows more than six times more light to be collected than traditional Czerny-Turner spectrograph designs. In conjunction with a high-performance 1024 x 256 element CCD detector and Kaiser's proprietary HoloPlex™ grating technology, the **RAMANRXN1™** spectrometer is capable of providing fast, simultaneous, full spectral collection of Raman data at high spectral resolution. The **RAMANRXN1™** spectrometer allows simple grating replacement using pre-aligned grating modules. The capability to change gratings allows users experimental flexibility for lower or higher resolution spectroscopy, or to use gratings designed for specific application. The glass-encapsulated holographic transmission design provides experimental high-performance and operator ruggedness to the spectrograph.

Sampling optimization is provided for by utilizing high performance fiber-coupled accessories; the AirHead™ for gas-phase monitoring, the MR Probe probe head for *in situ* liquids or non-contact solids monitoring, the MK II for Raman depolarization ratio studies, the Raman microprobe for sample visualization, mapping, or imaging, and the Analytical Sample Compartment for routine laboratory or quality assurance purposes. Fiber optic sampling and probe technologies enable the **RAMANRXN1™** instrument to analyze static laboratory samples or real time *in situ* sample volumes ranging from 5mL to gallons.

When used in conjunction with Kaiser's Raman Calibration Accessory and protocols, the **RAMANRXN1™** analyzer can produce wavelength independent databases, chemical models, and band assignments that may be transferred between instruments and laboratories. The **RAMANRXN SYSTEMS™** suite of analyzers is ideal for analyzing, monitoring, and controlling chemical processes.

Functions

- Research & Development
- Quality Assurance / Quality Control
- Reaction Chemistry, Optimization, & Yields

System Benefits

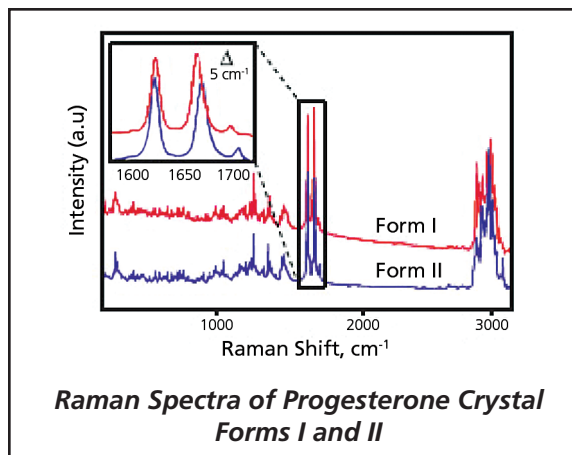
- Specificity of mid-IR, but with the ease of sampling of near-IR
- No sample preparation required
- Accurate transfer of calibration models from lab-to-pilot-to-plant systems
- Simple to learn, easy to use
- Visualize chemical trends



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Advantages of Raman Spectroscopy...



Instrument Features

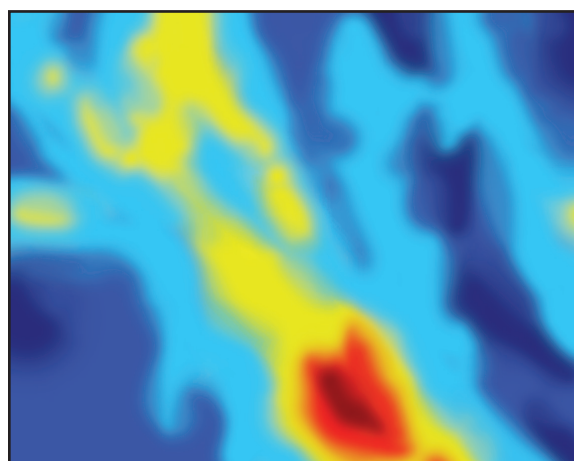
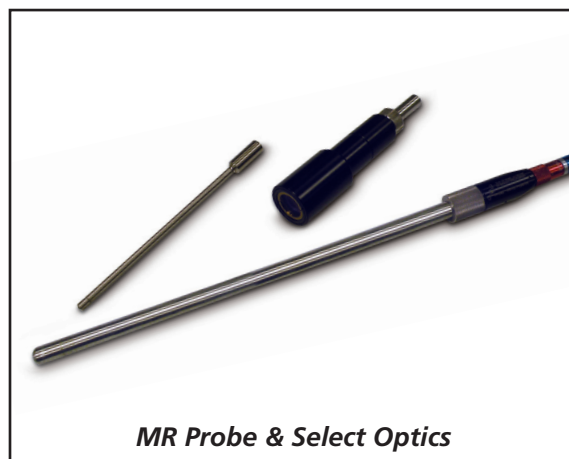
- 532 and 785 nm excitation versions (standard)
- Other wavelengths by request
- High quality TE-cooled CCD
- Replaceable grating modules (full coverage, low resolution, high resolution)
- Fiber-optically coupled to sampling accessories for system robustness
- Raman calibration and verification accessory (option)

Why Raman?

- Fast measurements
- Sharp spectral peaks for qualitative and quantitative analysis
- Univariate or multivariate prediction mode

Sampling Options

- Fiber-optic probe head for *in situ*, real-time analysis
- Optimized for low-wavenumber performance
- Reaction analysis software
- Alloy C276 immersion optics: temps to 450°C, pressures to 3000 psi
- High pressure extruder optic for *in situ* extrusion monitoring
- Non-contact optics: microns to 17 inches
- Routine analysis sample compartment (RXN-ASC) with sampling kit



Raman image of a single polymer in a copolymer matrix

Microprobe and Imaging Option

- Video and imaging software
- Color CCD (as standard) for sampling visualization
- Mapping and imaging options
- Real-time observation of laser-spot
- Long working distance objectives
- Polarization optics (visual and Raman)
- Transmission white light illumination

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