k-Space Associates, Inc.

kSA RateRat Pro

Optical Film Deposition Monitor

Real-time thickness, deposition rate, and optical constants (n,k)

The kSA RateRat Pro is a deposition rate monitor and advanced process control system. This non-invasive, in-situ, laser-based product makes thin-film deposition monitoring simple. By combining powerful advanced process control with real-time calculations of deposition rate, layer thickness and optical constants (n.k), kSA RateRat Pro makes monitoring even the most complex multi-layered materials easy and precise. The kSA RateRat Pro detects and analyzes surface reflectance in real time. Using sophisticated Virtual Interface algorithms originally developed at Sandia National Laboratories, kSA RateRat Pro determines deposition rate, layer thickness, and optical constants with as little as 300 Å of material and no advanced knowledge of the underlying films or substrate. kSA RateRat Pro provides real-time data analysis and output for feedback into process control software, and is ideal for input into MOCVD, MBE, sputtering, and evaporation control systems.

Features	Benefits	Applications
Two port or single port, normal incidence mounting	Flexible chamber mounting options	Simple installation onto most any MBE, MOCVD, E-Beam, Sputtering, or vacuum deposition chambers
Integrated real-time feedback for process control	Real-time analysis of growth rate, thickness, and optical constants (n,k)	Accurate multi-layer, optical film properties without prior knowledge of material
Growth recipe support	User -defined layer control table matched to growth recipe	End point layer control with 30nm of semitransparent material deposited
High speed diode laser and reflectivity signal analysis	High data rate acquisition during substrate rotation	Within wafer and multiple-wafer tracking during sample rotation up to 2000 RPM
Automated calibration procedure with supplied reference sample	Accurate process monitoring optical thin-films	Run to run accuracy and repeatability of reflectivity signal eliminates process variation
Viewport coating and sample wobble compensation optics	Accurate reflectivity values during viewport coating or sample wobble during rotation	Use on chambers with poor viewport coating control and sample stability to ensure signal is accurate and obtained throughout deposition process

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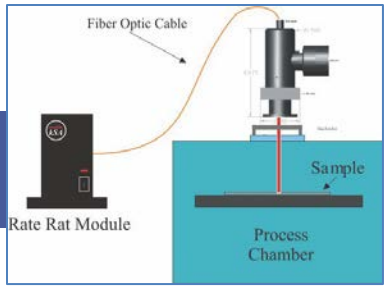
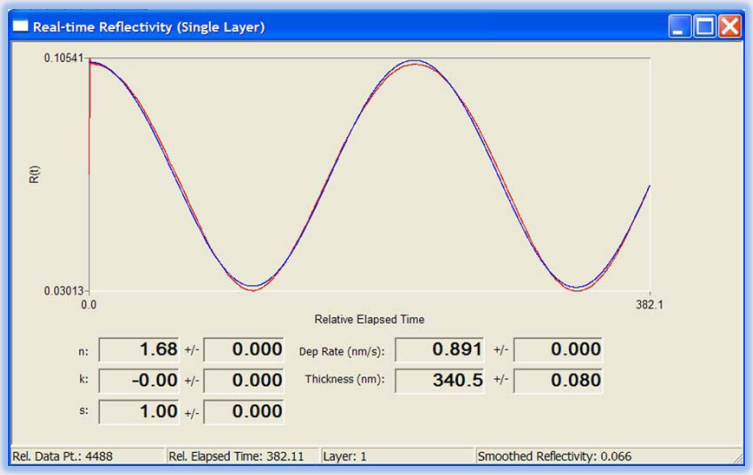


Standard Hardware and Software

- Real-time update of current n, k, and deposition rate values and standard deviation of these values
- Ability to generate a thin-film deposition recipe, so multiple layers can be fit properly in real time
- Each layer in the recipe has a user-estimated n, k, and growth rate value and can be triggered via an external trigger signal or be time or layer-thickness based
- Optional ability to output n, k, deposition rate, and thickness to analog output channels to provide input into a process control system
- If needed, external triggering may be used to time data acquisition with external events or multi-wafer substrate rotation
- User-friendly Windows XP or Windows 7 standard environment with file handling and extensive error checking
- Data storage in ASCII and binary file formats facilitate alternative data analysis

Raw laser reflectivity wave form is fit in real-time for obtaining growth rate, thickness, and optical constants (n,k) of each film during deposition



Hardware Options

Option/Part Number	Description
RR-C	For mounting on 1.33" mini-conflat flange(s) or slit viewports. Typically used on commercial MOVPE reactors.
RR/U-375/405/532	Fully integrated shorter wavelength laser for faster determination of film thickness, deposition rate and optical constants (n,k).
RR-SWRC	User-programmable recipe software module for layer thickness and repetition. Additional Rack mount enclosure (RAT-RACK) is available for applications that require more than eight (8) I/O lines supported by the standard rack.
RR-TRG	Laser-based rotational triggering module for sample rotation synchronization.

Performance Specifications

Surface Reflectivity	0.1 to 100% at laser wavelength
Layer Thickness Range	30nm to >5um* Depending on material and laser
Sample Rotation	0-2000 RPM
Viewport to Sample Distance	50mm-1m
Viewport Mount	1.33" to 6" CF

Your partner in thin film metrology

k-Space Associates, Inc., is a leading supplier to the surface science and thin-film technology industries. Since 1992, we've delivered the most advanced thin-film metrology tools and software thanks to close collaboration with our worldwide customer base.