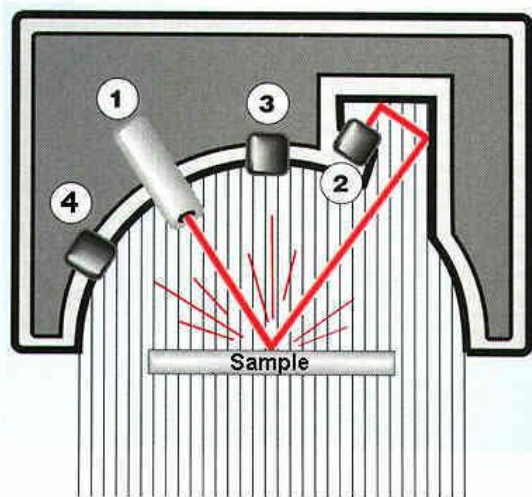


Introducing - μ ScanII

— fast, accurate, optical surface roughness measurement —

Measurement Head



With hundreds of the first-generation instruments in the field, providing customers with needed data, we are proud to introduce the μ ScanII. This simple, hand-held, Scatterometer measures RMS roughness of specular surfaces, specular reflectance, and BRDF. It can be operated entirely autonomously via its internal battery and BTLE radio to transmit data to a smart device. The μ ScanII also can be tethered to a Windows10 PC via the integrated USB connector which also charges the internal battery. A version of the μ ScanII is available with the radio disabled in firmware for secure customer environments. Roughness, reflectivity, and BRDF can all be saved locally on the instrument to allow long term and independent logging, or immediately transferred to the host.

- Measure roughness, reflectance and BRDF with one simple, hand-held instrument
- Connects to a PC via USB or to your smart device via Bluetooth for remote operation and configuration
- Open API makes integration of this instrument as easy as a sensor. Connect to a terminal & send or receive commands.
- Simple two point calibration procedure allows accurate BRDF measurements across seven orders of magnitude.

One of the innovative elements of the new μ ScanII is its data acquisition capability. Using logarithmic amplifiers, the full sensitivity range of the Silicon sensors can be utilized – 7 orders of magnitude sensitivity. This allows for measurement of the shiniest mirrors to the least reflective surfaces. Pulse width modulation of the laser eliminates noise from background illumination for stand off applications.

We've taken everything we know from our experience with our larger CASI and TASC systems and integrated that along with customer feedback into our newest μ ScanII. We hope you like it!

FAST

μ Scan uses analog amplifiers built right into the system for fast and configurable data capture.

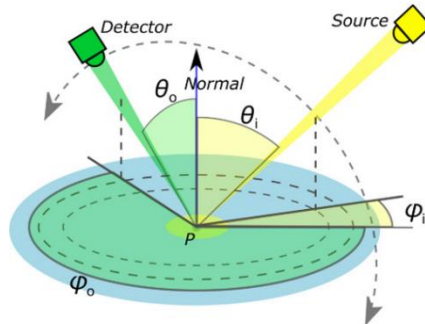
NON-CONTACT

The illumination spot is located nominally 1 mm above the worksurface. Thus, the μ ScanII can be fixtured to operate above the sample or placed directly on the surface of interest making it ideal for automated or lab environments.

FLEXIBLE SOFTWARE

Use our Windows10 application via the on-board USB or write your own with our open API

BRDF and RMS from First Principles



We see things because they scatter light. Scatter is quantified in "BRDF" units which is simply scatter power per unit solid angle normalized by the incident power on the sample and the cosine of the scatter angle from surface normal. Most surfaces scatter more near the specular beam and a lot less far from it. Amazingly the BRDF tends to fall off as a straight line when plotted as the log of BRDF vs. the log of scatter angle. The μ ScanII takes advantage of this by sampling two points and then estimating the full BRDF. For shiny surfaces that scatter from mild roughness (and not films or particulates) the BRDF (over a range of angles) can be converted to the

related roughness (over a range of surface frequencies). A laser diode is the light source and fixed detectors measure scatter and the reflected specular beam. The specular measurement gives the specular reflectance and the scatter measurements provide the BRDF as indicated above. The surface roughness is found under the assumption that roughness is causing all of the scatter. This calculation is made over the default range of 0.01 to 1.0 μm^{-1} , which is a commonly used range for light scatter. The μ ScanII lets you adjust the portion of the power spectral density (PSD) curve over which it evaluates roughness to correlate to other measurement techniques. Optical scatter is the only technique to allow evaluation of the surface across multiple instrument sensitivity ranges. As a result, roughness measured on a micro-interferometer or AFM can be directly compared to the μ ScanII over the same integration range.

System Specifications

Measurement Head

Dimensions	5"h x 3½"d	
Weight	1¼ lbs.	
Time of Measurement	< 0.1 seconds	
Spot Size	1 mm	
Repeatability	±0.5%	
Accuracy	±3% Scatter	±2% Reflectance
Wavelength	670nm (others available)	

Measurement Range

Roughness – Ra & RMS

1Å up to 1100Å (0.004 to 4.3 $\mu\text{in.}$)
Over a bandwidth of 0.01 to 1.0 μm

Reflectance 0.1 to 1.0

BRDF 10^{-6} to 10 (sr^{-1})

Temperature Coefficient

Scatter detectors	±0.1%/per °C
Reflectance detector	±0.15%/per °C

SERVICES AVAILABLE

- Technical Support
- Installation and Setup
- Maintenance
- Application Support
- Hardware Support
- Guaranteed Warranty
- Custom measurements using our lab services

Technical Support
The Scatter Works, Inc.
17595 S Palmer Rd.
Oregon City, OR 97045
Phone 971-341-9855
www.thescatterworks.com

Reliability

To quote Robert Heinline: "The perfect machine has no moving parts" and that is the μ ScanII. A scatter pattern is created by an incident laser aimed at the surface and measured by fixed detectors. The laser is guaranteed to operate for a minimum of 20,000 hours – so expect a long shelf life!

TECHNICAL SUPPORT

Our commitment is to respond to you as quickly as we can. Give us a call, we're almost always available and happy to work through your application.

TURNKEY SOLUTIONS

If your application is more sophisticated than a simple roughness or scatter measurement, we've got you covered with a line of incident plane and total hemispherical scattering instruments. Lab measurements are also available on a fee-for-service basis.