SIMSCOP
理 科 仪 器

Wideband Handheld Confocal Raman Skin Analyzer

DermDive Series

2023 V1

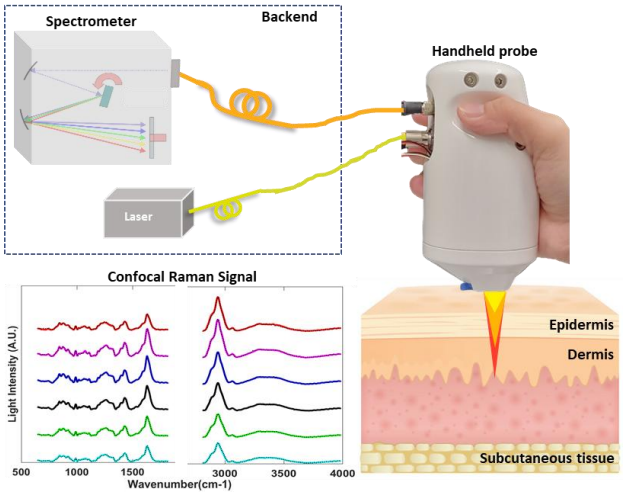
For customized projects please Contact us:

info@simscop.com

DermDive - the first wideband handheld confocal Raman skin analyzer in the world

Confocal Raman Spectroscopy (CRS) is a groundbreaking optical technology used extensively for biological tissue analysis, prized for its noninvasive approach, pinpoint accuracy and comprehensive biochemical insights. Despite its advantages, traditional CRS systems are encumbered by limited detection, cumbersome designs, reduced flexibility, slow data collection, and escalated costs.

To counter these challenges, we are developed a compact, handheld CRS system, aptly named "**DermDive**". DermDive is the world first wideband handheld confocal Raman skin analyzer covering both finger-print region (FP, 450–1750 cm^{-1}) and high wavenumber region (HW, 2800–3800 cm^{-1}) with a handheld probe. **DermDive** has adjustable and user-defined measurement time suitable for various applications. It provides molecular information at different skin layers noninvasively, up to 200um.



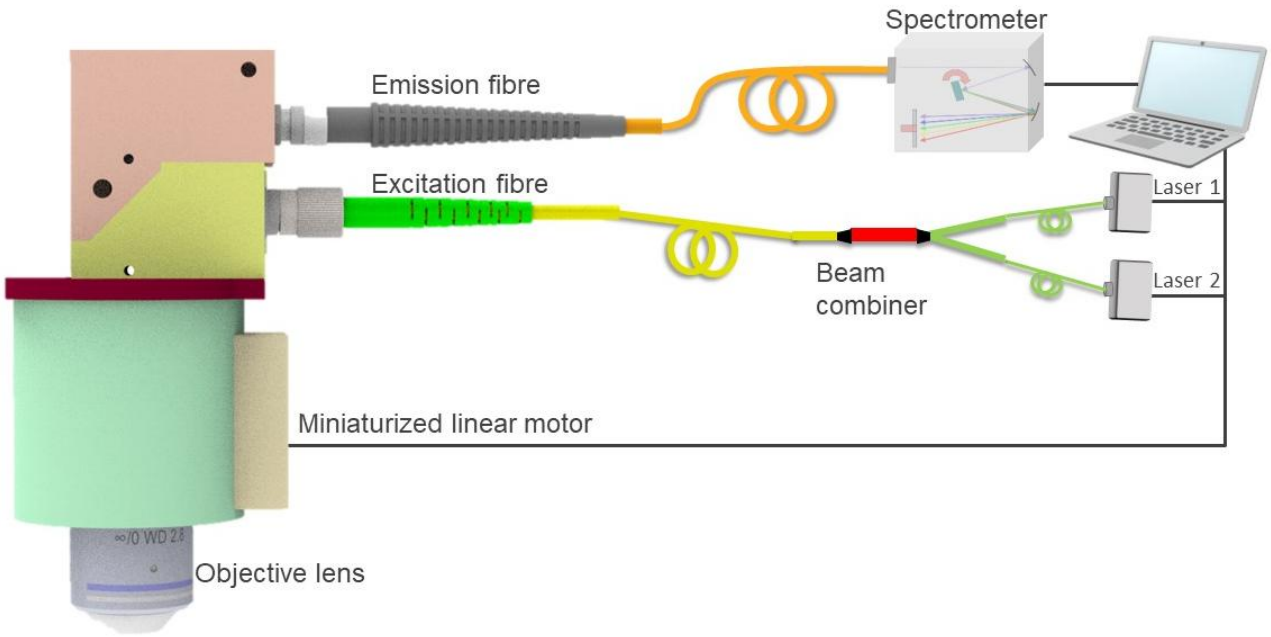
DermDive is designed to be user-friendly for skin diagnosis on various parts of human body, thanks to its flexibility.

Features

- A harmonized integration of single or dual-wavelength lasers through an efficient (>90%) wavelength combiner, enabling near-instantaneous excitation.
- The groundbreaking Raman Spectra Separation Algorithm (PRSSA), a pioneer in spectrum separation, harnessing the maximum a posteriori probability (MAP) estimate. This offers an astounding >99% accuracy, as evidenced in both laboratory simulations and real-time human skin analyses.
- A notable reduction in data collection time, outpacing conventional CRS systems by over 50%.

✓ Noninvasive
✓ Fast
✓ User friendly
✓ Handheld
✓ Depth profiling
✓ Safe
✓ Fingerprint region + high wavenumber region

Light Path Diagram



Available Raman Spectra Database

Natural moisturizing factors (NMF), water, ceramide, keratin, lactic acid, urea, urocanic acid at different depths

Compact handheld confocal probe

GUI for data acquisition and analysis. Embedded Raman library dedicated for skin stratum corneum.

Portable backend with dedicated electrical and optical modules

Spec.	DermDive
Laser Source	633nm 785nm
Raman Range	FP: 450 – 1750cm-1; HW: 2800-3750cm-1
Axial Resolution	10um~20um
Stratum Corneum Thickness*	Up to 200um
Sensitivity	60dB
Scanning time	2-10s/depth
Probe Head Size	~12 cm × 6 cm × 5 cm
Probe Head weight	~800g
System size	~ Height: 1m, Width: 50cm, Length: 50cm
System weight	~ 40kg

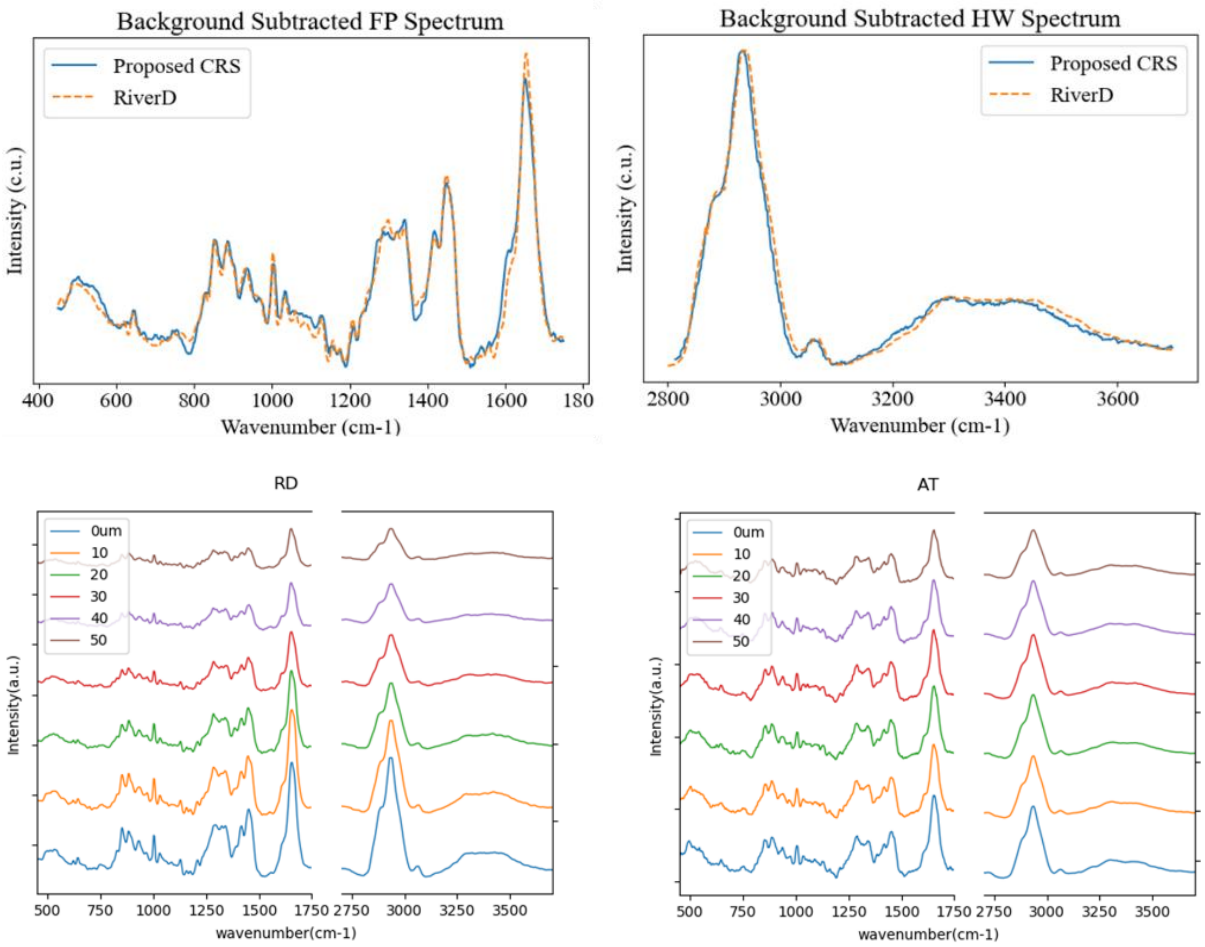
Testable Substances & Parameters

- Natural Moisturizing Factors(NMF):
- Pyrrolidone carboxylic acid
- Ornithine
- Serine
- Proline
- Glycine
- Histidine
- Alanine
- Ceramide
- Keratin
- Lactic acid
- Urea
- Urocanic acid
- Water content

- Stratum corneum thickness
- Penetration depth of a certain chemical
- Other chemicals of interest upon request

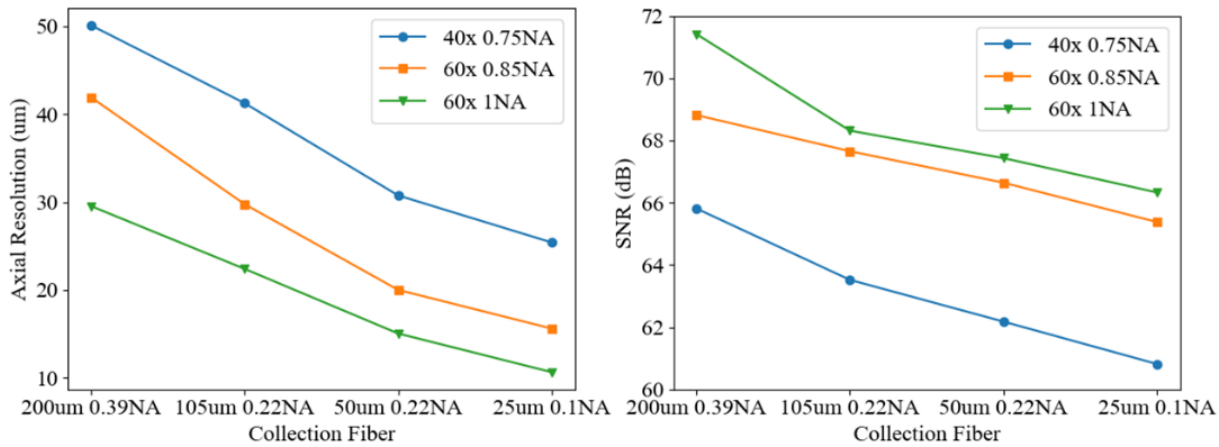
*Stratum Corneum Thickness refers to the measurable skin thickness.

Benchmarking with RiverD Benchtop CRS



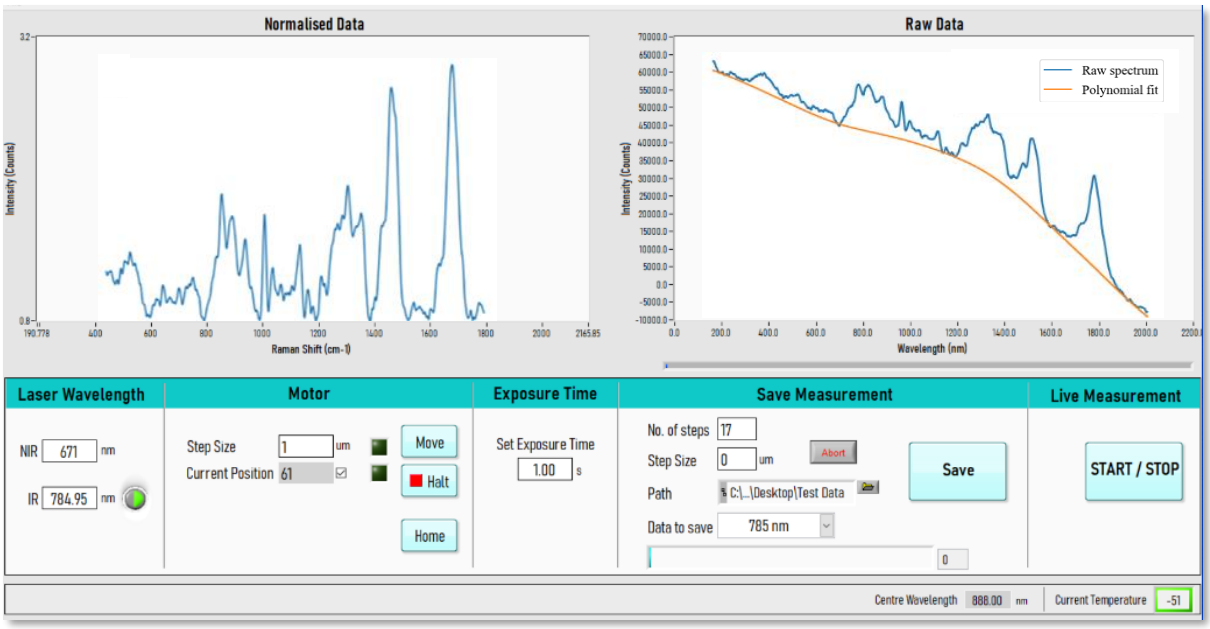
Spectra of DermDive and RiverD at single depth and Various depths. Spectra qualities are comparable.

Optical Performance Characterization



Axial resolutions and sensitivities with different optical components.

Software



Software for automatic skin data acquisition at all depths

Software for on-the-spot skin constituents' analysis

SIMSCOP China
Telephone: +86 195 8744 3246
Email: info@simscop.com

SIMTRUM Singapore
Telephone: +65 6996 0391
Email: info@simtrum.com

SIMSCOP 理科仪器
www.simtrum.com