

Wideband Handheld Confocal Raman Skin Analyzer

DermDive Series



2024 V1

For customized projects please Contact us:

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Introduction

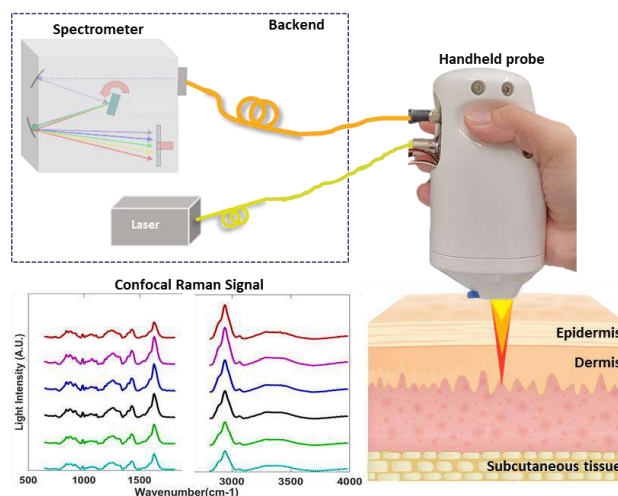
DermDive - the first wideband handheld confocal Raman skin analyzer in the world

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 have 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 200 nm.

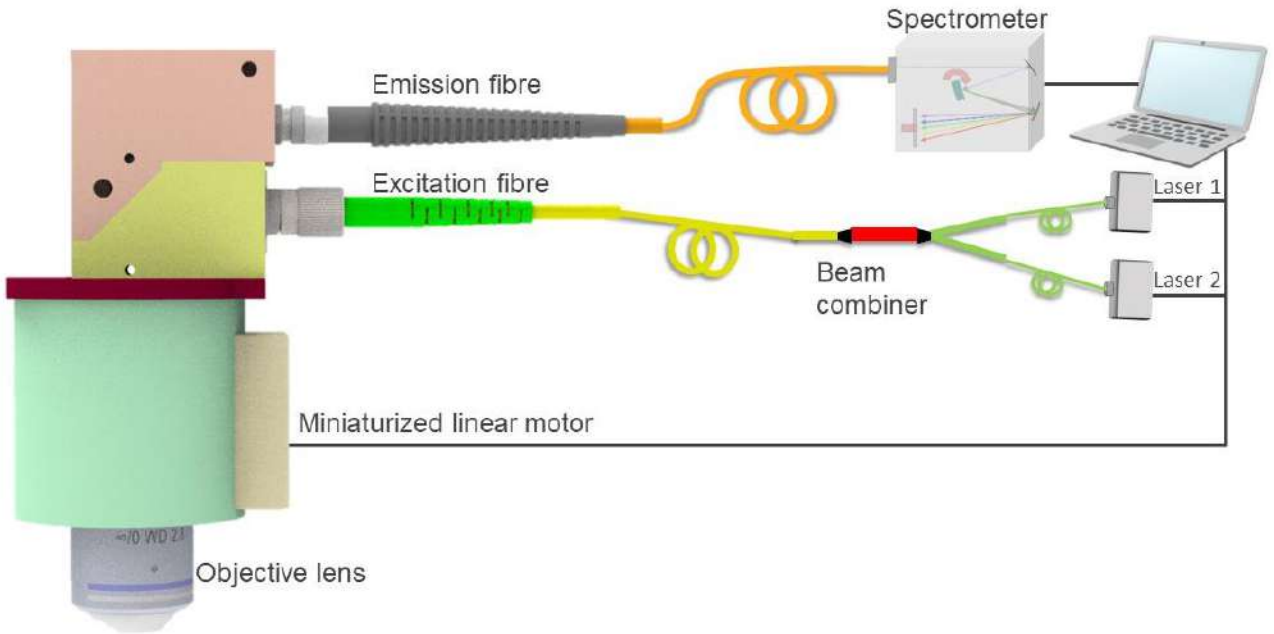
DermDive is designed to be user-friendly for skin diagnosis on various parts of human body, thanks to its flexibility.



Features

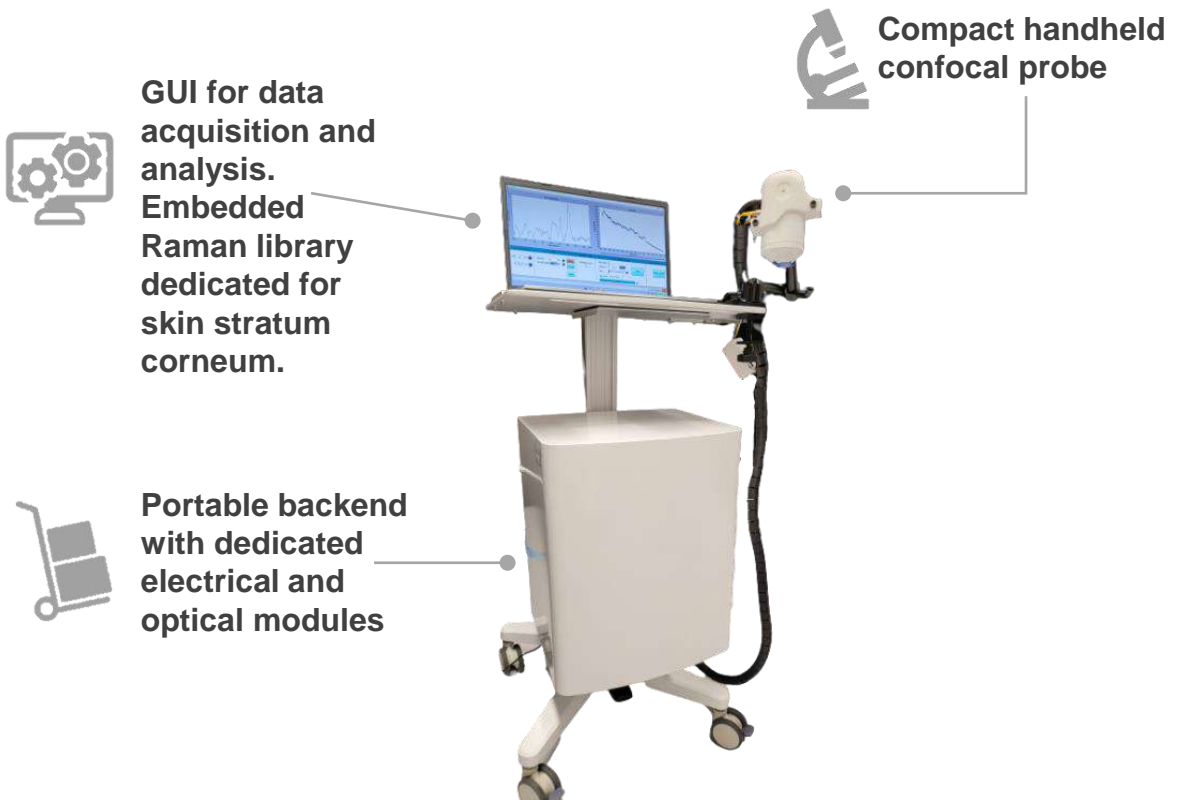
- A harmonized integration of single or dual-wavelength lasers through an efficient (>90%) wavelength combiner, enabling near-instantaneous excitation.
- The groundbreaking Raman Spectra Separation Algorithm (PRSSA), a pioneer in spectrum separation, harnessing the maximum a posteriori probability (MAP) 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

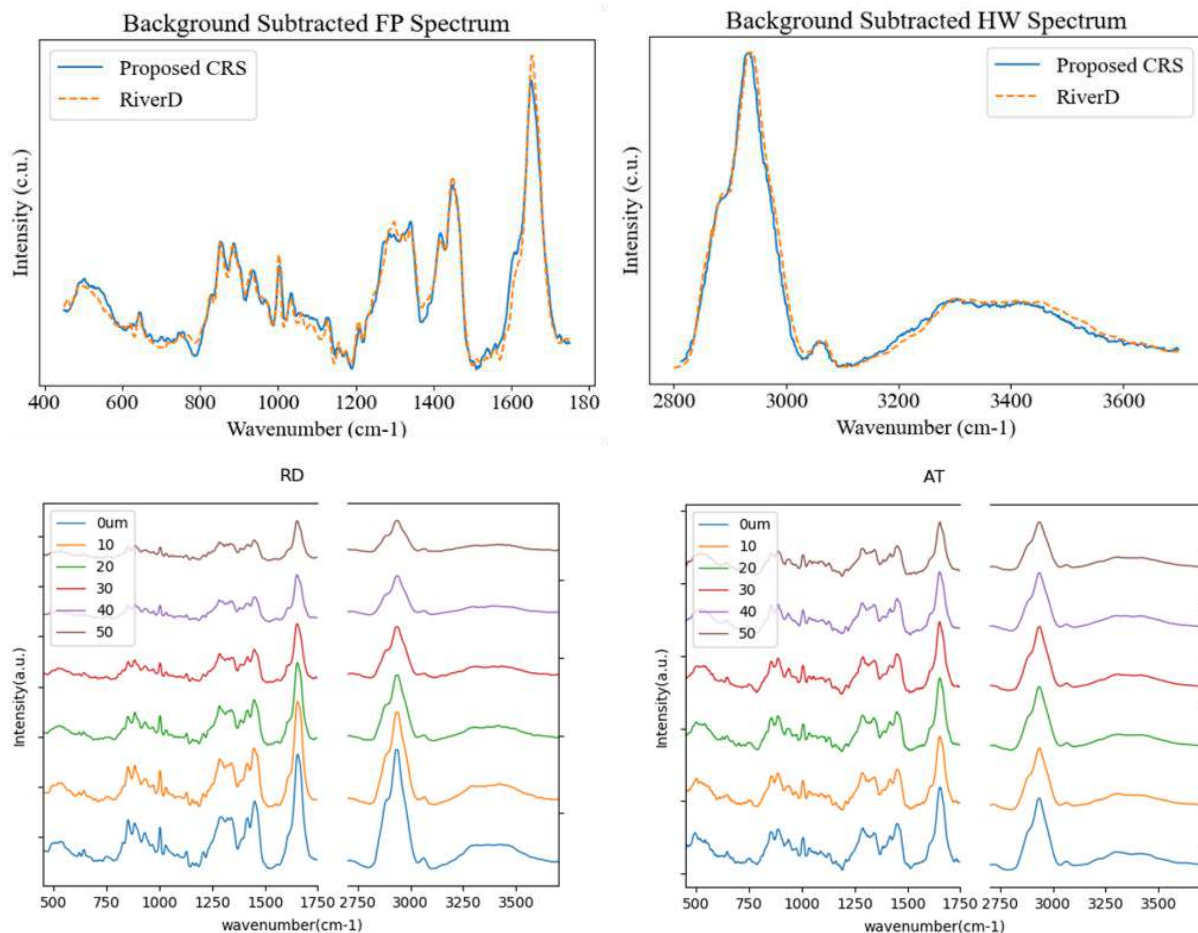
Natural moisturizing factors (NMF), water, ceramide, keratin, lactic acid, urea, urocanic acid at different depths



Specifications

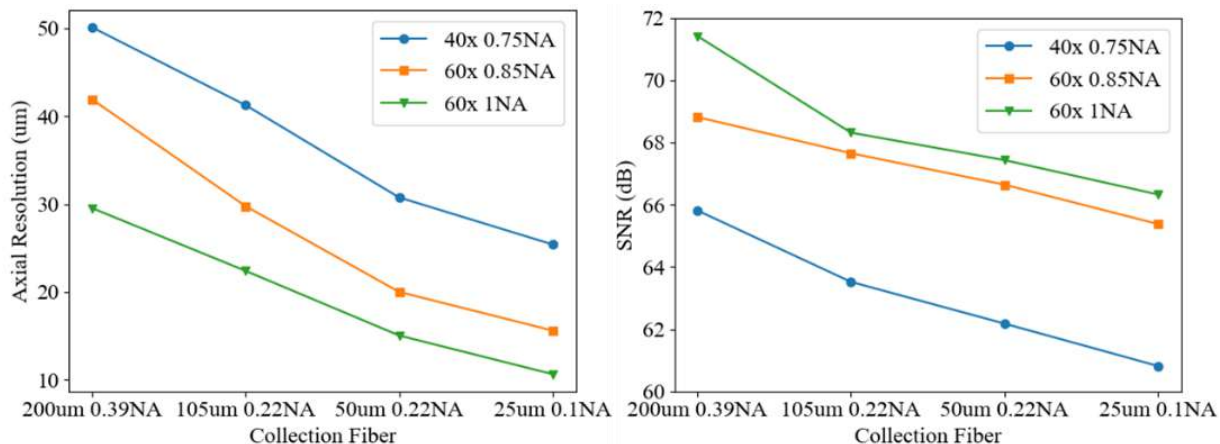
Parameter	DermDive
Detection Range	FP: 450 – 1750cm ⁻¹ ; HW: 2800-3750cm ⁻¹
Axial Resolution	10um~20um
Stratum Corneum Thickness	up to 200nm
Sensitivity	60dB
Scanning Time	2-10s/depth
Probe Size	~12 cm x 6 cm x 5 cm
Probe Weight	~800g
Device Size	~ H: 1m, W: 50cm, L: 50cm
Device Weight	~ 40kg
Raman Library	Natural Moisturizing Factors(NMF): Pyrrolidone carboxylic acid Ornithine Serine Proline Glycine Histidine Alanine Ceramide Keratin Lactic acid Urea Urocanic acid Water content
Other Parameters	Stratum corneum thickness Penetration depth of a certain chemical Other chemicals of interest upon request

Benchmarking with RiverD Benchtop CRS



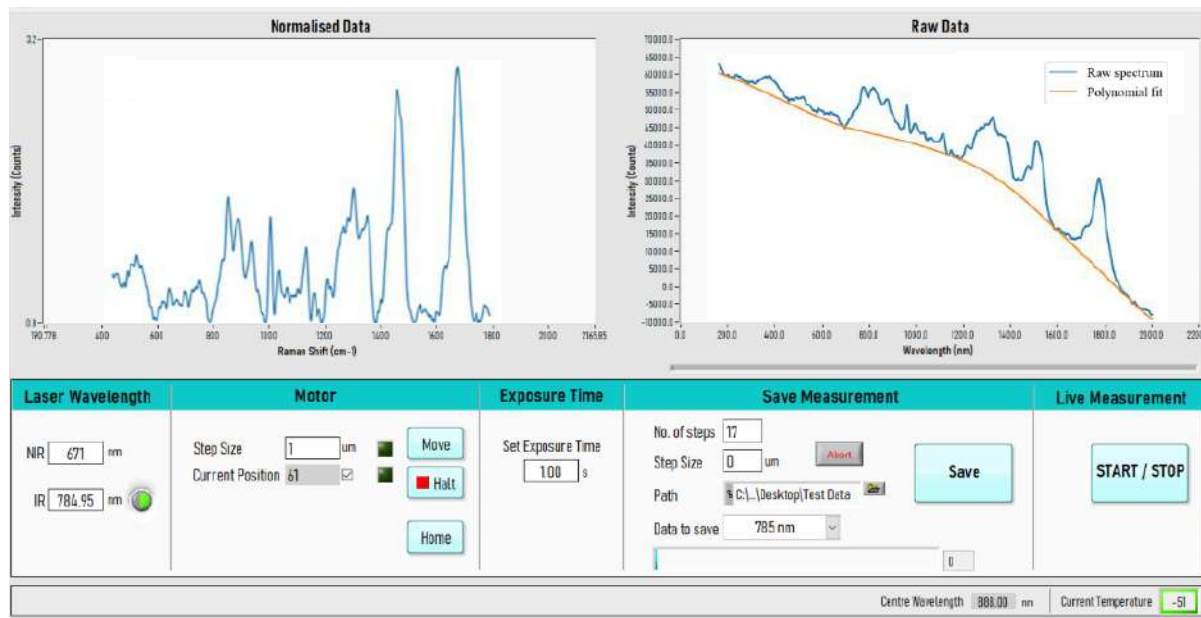
Spectra of **DermDive** and RiverD at single depth and Various depths. Spectra qualities are comparable.

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