Speed • Sensitivity • Simplicity

PROTA-3S™

FT-IR Protein Structure Analyzer

- Incredibly Fast Measurements
- Low Concentration, No Limit on High Concentration
- New Independent Software

BioTools Characterization Experts: Chirality & Biologics

FTIR Spectroscopy of Biologics

(peptides, proteins, hormones, enzymes, antibodies, growth factors and more)

Introduction

PROTA was introduced in 1998 as the first dedicated solution for structure elucidation of biologics and since has become the industry's preferred choice. PROTA provides a fast, cost-effective and sensitive way to determine secondary structure of a protein or to follow structural changes due to perturbations. This turnkey system is designed to be used by both spectroscopists and non-spectroscopists. The new independent software is user friendly and intuitive guiding users through data acquisition and analysis. PROTA includes all of the functions, in one integrated package, required to link IR spectral data and protein structure.

Applications

Comparability Studies (batch-to-batch; biosimilars vs. innovator)

Formulation studies (liquids and solids), effects of excipients, pH and buffers

Crystallizati

Determination of secondary structures (α, β...)

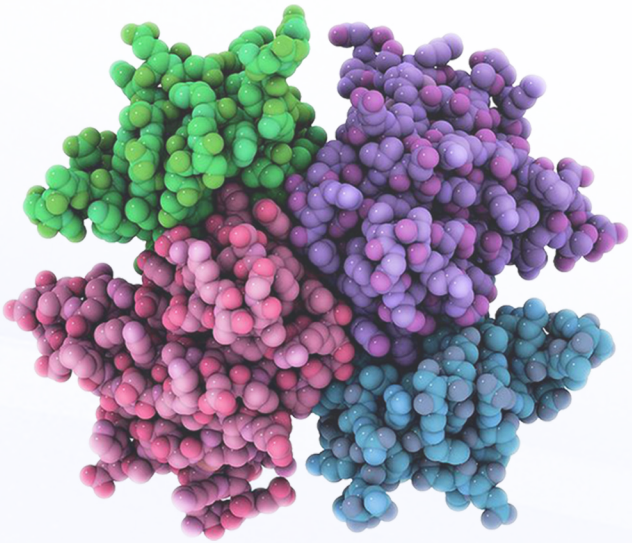
Structure in aggregates

Methionine O

Protein-protein, protein-DNA/RNA and protein-drug interactions

PROTA-3S™

The U.S. Food and Drug Administration lists (in their presentations) FT-IR as one of the spectroscopic techniques for protein structural studies including stability, comparability and forced degradation



Industry & Academic Leaders Choose PROTA for Their Lab's Protein Research & Development (selected list)

Abbott/Abbvie	Merck
Amgen	Millenium Pharmaceuticals
AstraZeneca	National Cancer Institute
Baxter	Novartis
BioChem Pharma	Novo Nordisk
BioConvergence	Oregon State University
Biogen Idec	Pasteur Institute
Bristol-Myers Squibb	Pfizer
Covance Biotechnology	Regeneron
Curagen	Royal Danish School of Pharmacy
Eli Lilly	Shire Biologics
Genzyme	Teva Pharma
GlaxoSmithKline	Trimeris
Halozyme	University of Alabama
Human Genome Sciences (GSK)	University of Colorado
Imclone	University of Kansas
KBI BioPharma	University of N. Colorado
KBio	University of Texas Medical Center
Magellan	USDA-NCAUR

on condition screening

Drug delivery

xidation

Stability studies (thermal and chemical)

Stress Tests and QC

Presence of Si Oil

Mutation studies

BioTools

Advantages of FT-IR

Study your sample at its final formulation (no dilution required)

Fourier Transform Infrared Spectroscopy

Any Formulation

- Liquids
- Solids
- On a Patch
- On a Membrane
- On a Chip
- With Excipients
- With Nanoparticles
- With Microspheres

Fast Measurements!

From Low to High Concentration

Can you tell if your FTIR spectrum is correct?

Best methods for l

Best methods to subtract the buffer from your protein FTIR spectrum

Can yo

What is better - 2nd derivative or deconvolution?

'Automatic' vapor subtraction - beware of the 'magic' and does it really matter?

Best m

Can you tell small differences in your FTIR protein spectra?

What to submit to regulatory agencies?

Can one compare solid and solution measurements?

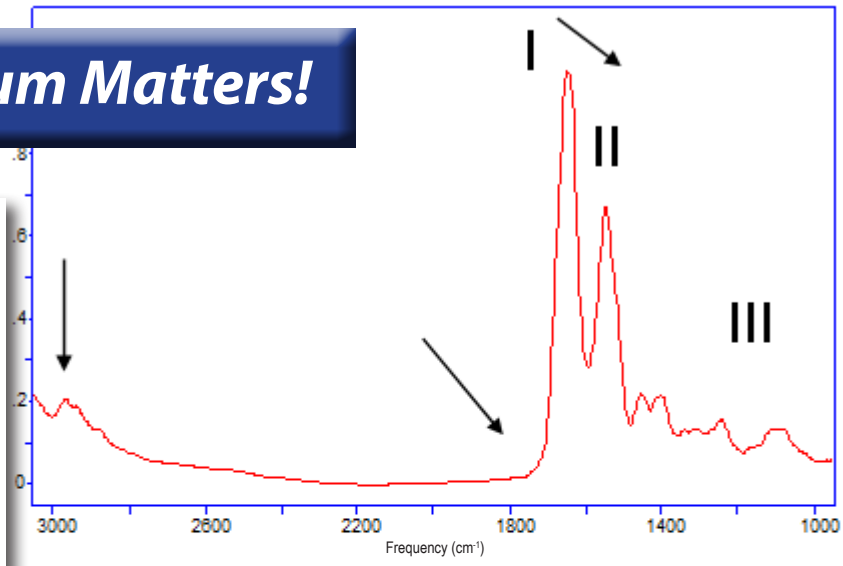
Are there any differences in measurements of peptides & pr

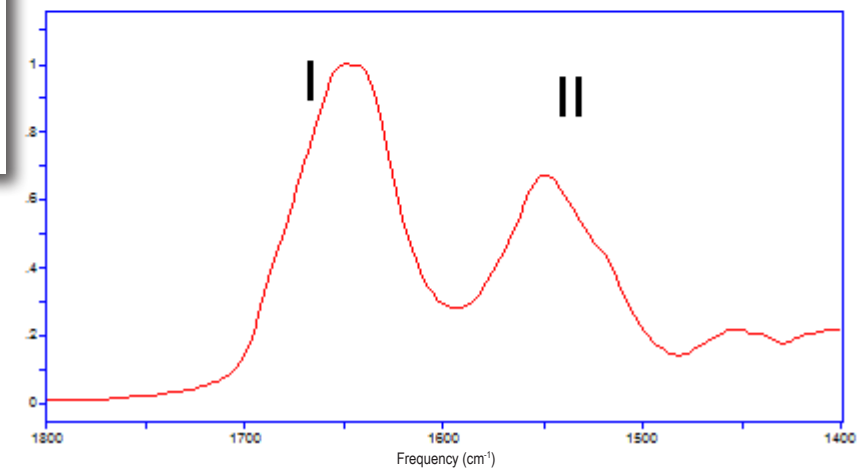
View of "Perfect" FT-IR Spectrum of Protein in Solution

The Correct Spectrum Matters!

Protein Spectrum Must Have the Following:

- Amide I/II ratio: 1.2-1.7
- Presence of Amide III bands
- Presence of C-H stretching modes
- Flat baseline between 1800-2200 cm^{-1}
- Gradual baseline rise below 1800 cm^{-1}
- No vapor bands





ow concentration protein measurements

u compare FTIR and CD spectra?

ethods for high concentration protein measurements

Your Research Deserves the Best!

Are your excipients interfering in the FTIR spectrum of your protein?

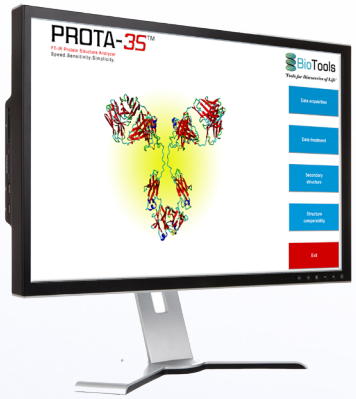
Differences between transmission and ATR measurements
'What to use and when'

oteins?

Visit www.btools.com for video answers to FT-IR questions
Have a FT-IR question? Email info@btools.com

BioTools

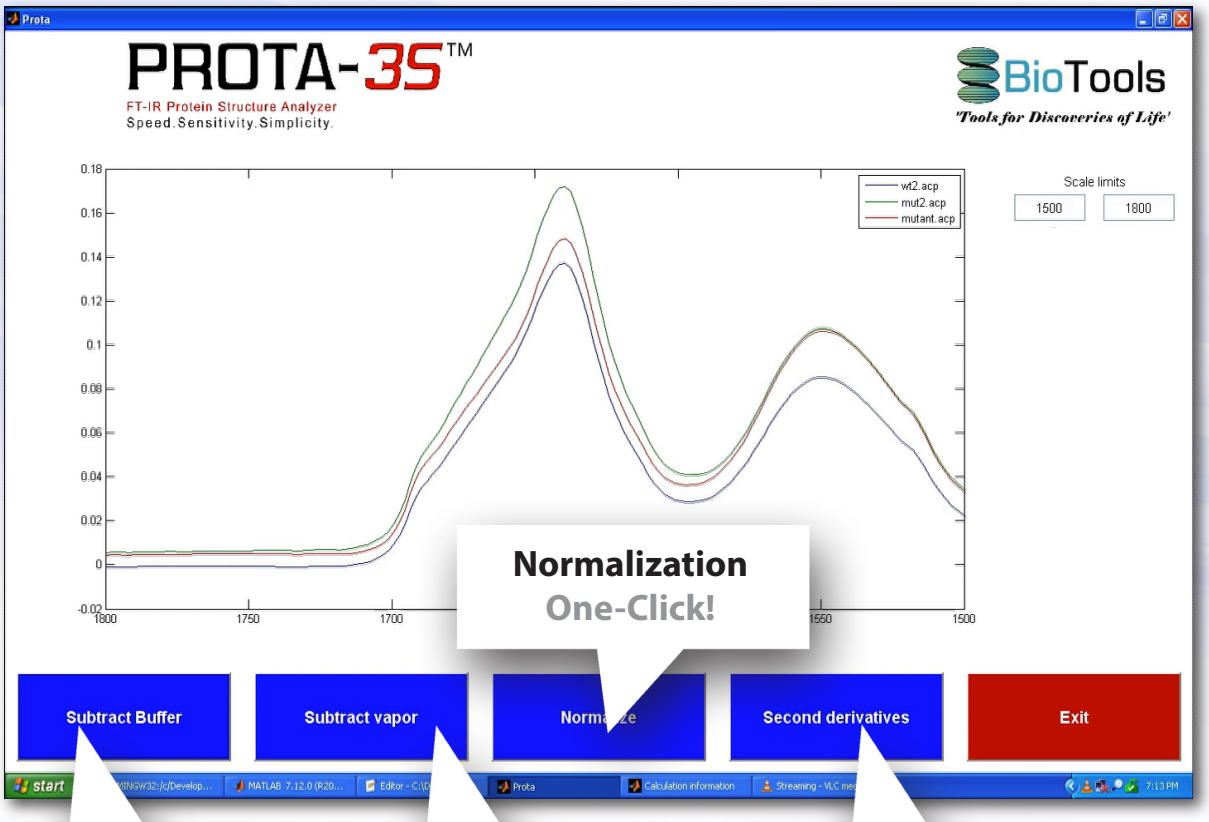
PROTA-3S™



NEW Independent User Friendly Software

Open Your Spectra and... **One-Click**

"One Click" Single & Multi-Spectra Analysis



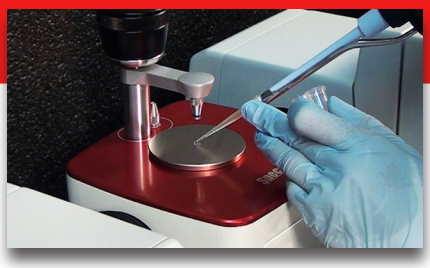
Normalization
One-Click!

Buffer Subtraction
One-Click!

Vapor Subtraction
One-Click!

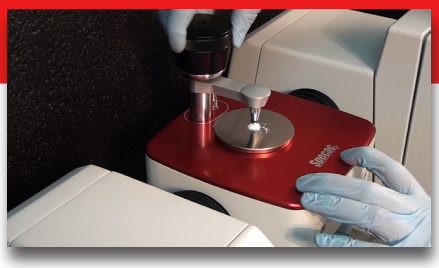
2nd Derivative
One-Click!

View the PROTA-3S video at www.btools.com



Protein samples with concentrations as low as 0.25 mg/ml in H_2O can be routinely measured with PROTA-*3S*

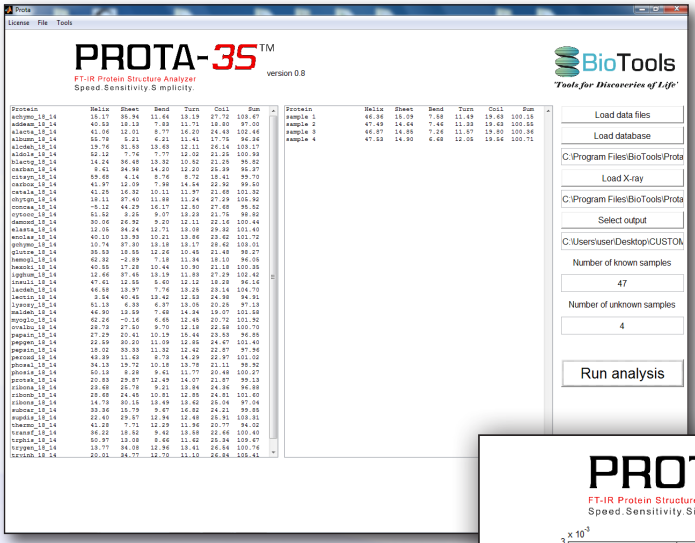
1 Minute
Protein Collection Time

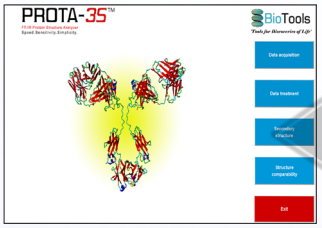


PROTA-*3S* can be used to determine protein secondary structure with both solid and liquid samples

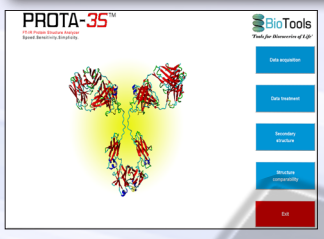
Software Screenshots

Secondary structure is calculated with factor analysis using the largest commercially available IR protein database.

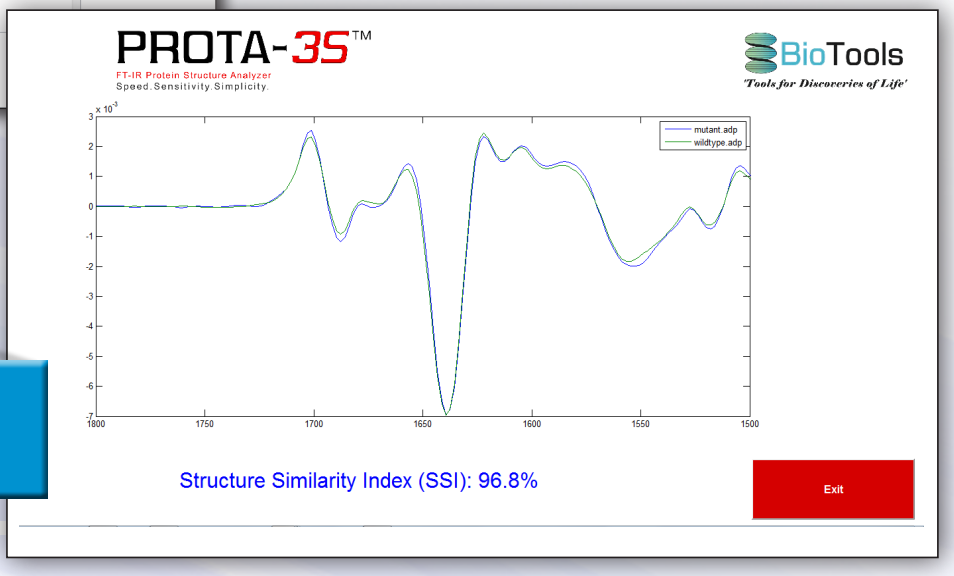


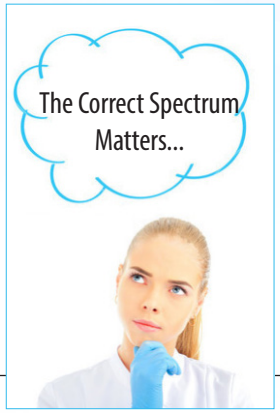


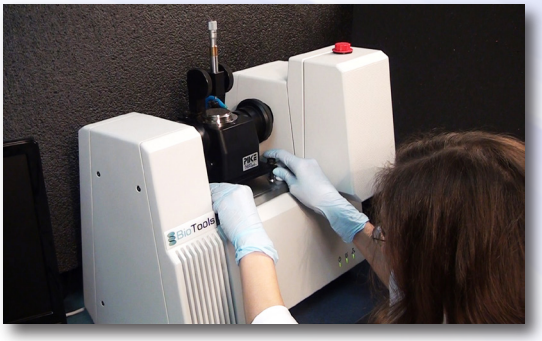
Secondary Structure



Structure Comparability







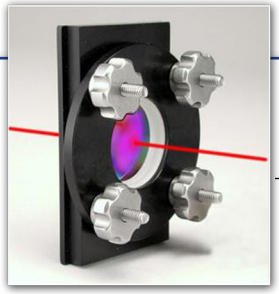
BioTools

Transmission Studies

BioCell™

CaF2 cells for IR/CD spectroscopy

The CaF2 cell for IR/UV-CD spectroscopy is a unique, easy to use accessory for water based experiments that is universally compatible with all FT-IR Spectrometers.

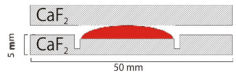


The World's Number 1 FT-IR Cell for Proteins

Universally compatible with every FT-IR spectrometer

The cell is formed from two optically clear plates: one of which is perfectly flat; and its partner which has a precisely formed recess surrounded by a slightly deeper groove. The recessed area holds the sample against the opposing flat plate, while the surrounding groove keeps the sample from becoming displaced and spreading out. This unique design ensures the sample is uniformly maintained in the path of the light for good data acquisition as well as preventing evaporation. The simple design also makes the cell easy to dissemble and clean between measurements. Wide range of pathlengths & custom pathlengths are available.

- Specifically designed for FT-IR & CD/VCD spectroscopy of biological molecules
- Useable spectral range 67,000- 1,000cm^{-1}
- ~6µm - ideal for aqueous solutions
  ~4Oµm - ~80µm - ideal for D_20 experiments
- Micro-liter volumes
- Size: 5 mm thickness x 50 mm diameter
- Two choices of temperature controllers

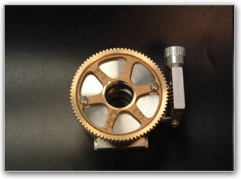


BioTools

The BioCell™ comes with a standard holder or a choice of holders below:

BioJack/T™
High precision cell holder
(Thermostated available)

AccuTune™
Gear for BioJack for extreme precision and ease of use



TempCon™ Peltier based temperature controller

The TempCon™ temperature controller unit is designed for use in FT-IR spectrometers with two types of windows: large circular BioCell™ windows and hexagonal windows. The accessory can be controlled either manually or through computer interface. Custom models available.

- Typical temperature range: -4 ^{0}C to 90 ^{0}C
- Variable temperature ramp programmable
- Soak time programmable
- Accepts both BioCell™ and hexagonal type windows
- Custom made holders can be ordered for non-typical window designs

ATR and Other Studies

The technique of Attenuated Total Reflection (ATR) allows direct comparison of proteins in liquid vs. solid state. Its ease of use simplifies the process of measurement and is ideal for comparison of environmental conditions such as the process of formulation.

ATR

PIKE TECHNOLOGIES
Spectroscopic Creativity

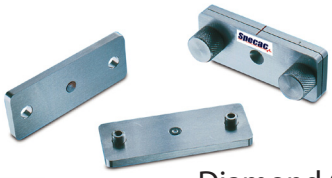
MIRacle™
Single or Triple Reflection ATR

Available with Flow Option

Quest Single Reflection ATR

Microscopy Studies

The microscope fits into the sample compartment of the Prota-3S instrument and can be used for analysis of a small amount of material or small particles.



Diamond Compression Cell

Specac

Solid KBr Pellet Kit

For Purging

Parker Balston

Recommended FT-IR Purge Gas Generator

BioTools

Specifications

PROTA-*3S* instrument:
FT-IR Spectrometer System

- Arid-Zone sample compartment with countercurrent purge flow in telescopic purge tubes
- Non-hygroscopic ZnSe beamsplitter
- High-sensitivity MCT detector
  Resolution: 1 - 64 cm^{-1}
  Spectral range: 5,500 - 805 cm^{-1}
- Fequency accuracy: (@ 1918 cm^{-1}): < 0.06 cm^{-1}

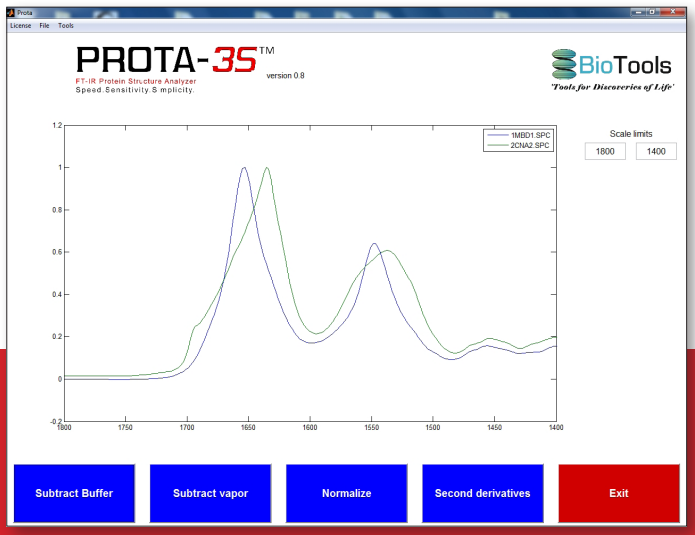
Easy to use and maintenance free the PROTA-*3S* Instrument features:

- Minimal mechanical components
- Scanning mechanism with a lifetime guarantee
- Permanently aligned optical system
- Fixed components with a patented interferometer scan mechanism
- All optics are non-hygroscopic
- Purging is not required for protection of optics
- The instrument can also be purged if needed for sampling

No consumables
No maintenance, no adjustments and a scan mechanism that has no wear

Long-life Source
10-year expected lifetime

The PROTA-*3S* delivers consistent, precise and reproducible results year after year



PROTA-3S™

Support & Consulting

PROTA-*3S*™

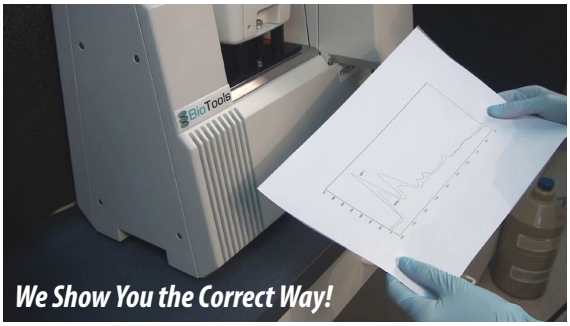
After Sales Service

- Installation and training on measurement and interpretation of FT-IR spectroscopy of proteins by experienced scientists
- Qualification provided (IQ/OQ/PQ)
- BioTools' combined service and technical protein application support

Technical Support and Maintenance

BioTools provides users of PROTA-*3S* with complete maintenance and technical support. Each instrument sold comes with a full one year support and warranty. Additional maintenance contracts can be purchased.

E-mail based help desk is open 365/24/7 at info@btools.com



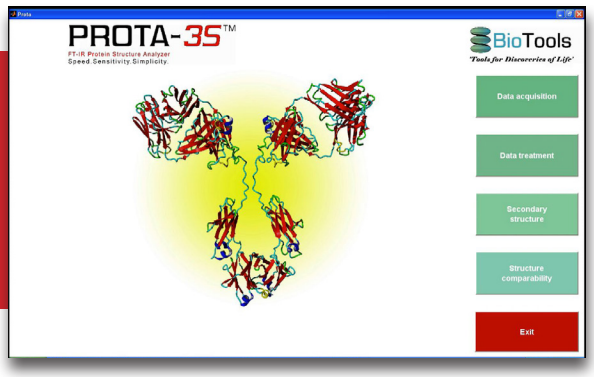
Feasibility Studies

For those interested in determining if FT-IR Protein Structural Analysis is appropriate for their applications or specific research conditions, BioTools offers feasibility studies using PROTA-*3S*. Studies include PROTA-*3S* measurements of particular identified or unidentified proteins or peptides, determinations of protein secondary structural changes with varying environmental effects, and formulation studies for liquids and solids.

Consulting

BioTools offers consulting services that bring our expertise on spectroscopy of biomolecules to bear on your applications and needs. Costs depend on the extent of the study and degree of urgency.

Demand More...
No Compromises...
Your Research Deserves the Best!

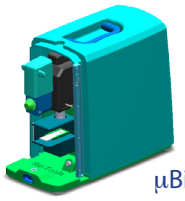


BioTools

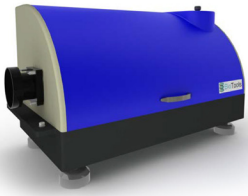
Characterization Experts: Chirality & Biologics

ChiralIR-2X™ (VCD)

ChiralRAMAN-2X™ (ROA)



μBioRAMAN™



Mantis™ (DualPEM VCD accessory)

ComputeVOA™

CompareVOA™

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