

## Minimální požadované technické parametry

Název technologie / vybavení: **Spektrometr pro měření absolutního cirkulárního dichroismu**

Stručný popis technologie / vybavení a stanovení výzkumného účelu a využití:

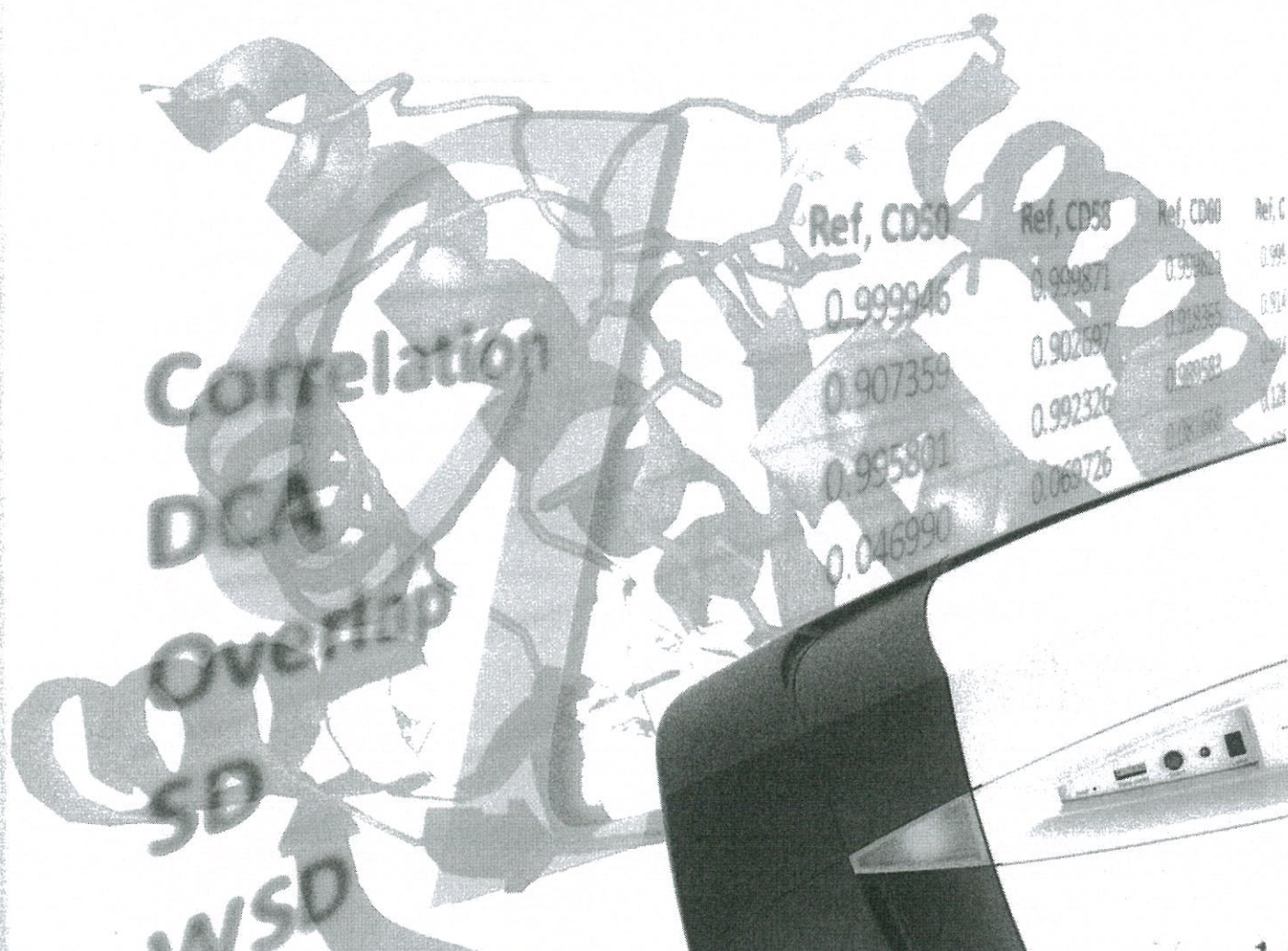
CD spektrofotometr umožňuje stanovení sekundární struktury proteinů (proteinových antigenů) a peptidů, které budou připravovány v rámci projektu FIT pro konstrukci vakcín, vývoj diagnostik a teranostik. Další využití je plánováno pro studium elasticity lipidních membrán, stanovení změny konformace a termální stability biopolymerů. Technologie je plánována pro výzkum a vývoj nanočástic na bázi lipoplexů pro cílení léčiv a genetických vakcín ve formě konstruktů nukleových kyselin (siRNA, mRNA, antisens oligonukleotidy, pDNA). Na VUVeL bude CD spektrofotometr využíván v rámci projektu FIT, CENATOX, Admirevet a dalších navazujících výzkumných projektů. Přístroj bude využíván také v rámci spolupráce s ICRC (společná laboratoř pro nanofarmakologii NanoPharm) při vývoji nových diagnostik a teranostik na bázi cílených nanočástic. Přístroj bude také využíván pro srovnávání výsledků s dalšími laboratořemi v zahraničí, proto je kladen důraz na měření absolutního cirkulárního dichroismu.

Popis parametru	Zadavatelem požadovaná hodnota	Uchazečem nabízená hodnota	Závaznost
<b>CHROMSPEC spol. s r.o.</b>			
<b>Applied Photophysics Ltd.</b>			
<b>Chirscan – Plus qCD</b>			
<b>Spektrometr pro měření absolutního cirkulárního dichroismu</b>	Ano	Ano	Podmínka
<b>Preferované technické požadavky</b> Měření signálu cirkulárního dichroismu v rozsahu vlnových délek alespoň 165 – 1100 nm jedním detektorem Detekce detektorem typu APD („avalanche photodiode detector“) s možností nastavení úrovně výtěžku („gain“) detektoru Dvojhranolový monochromátor, oba hranoly polarizují Vzduchem chlazený zdroj světla bez dodatečných výměníků tepla Automaticky uzavíratelná clona umístěná před monochromátorem a otevíraná pouze po dobu měření CD, LD a absorpční spektra musí být měřena současně. Rozlišení vlnových délek volitelné uživatelem do hodnoty 0.1 nm nebo níže Externí nezávislé měření teploty v prostoru pro vzorek Externí nezávislé měření teploty uvnitř kyvety Kalibrace včetně certifikátu od výrobce na absolutní CD nechemický standard. Automatické spuštění promývacího dusíku a zapnutí lampy v naprogramovaný čas bez nutnosti zásahu obsluhy. Citlivost (RSM-šum) v oblasti vlnových délek 170 – 300 nm bez použití vyhlazení při podmínkách měření 1 nm bandwidth a 2	Ano	Ano	Podmínka

s integrační čas musí být <0,04 mdeg Rozptyl světla při 200 nm musí být menší než 0,0004% Trvale temperovaný fotoelastický modulátor			
<b>Doplňková zařízení (accessories)</b> 6-ti poziční automatický karusel temperovaný Peltierovým článkem. Požadovaný rozsah teplot -15°C až 100°C, nebo větší. Míchání s nastavitelnou rychlostí ve všech pozicích. Odpovídající počet kyvet s optickou drahou 1 mm. Výměna kyvet nenarušuje atmosféru dusíku.  Zařízení pro měření lineárního dichroismu – (Couette cell) optimálně s rotujícím vnějším válcem pro odstranění Taylorových vírů. Smyková rychlost min 8.000 s <sup>-1</sup> . Rozsah měření 180 – 1100 nm s možností současného měření LD a Abs případně CD a Abs. Možnost přechodu z měření LD na CD bez fyzické výměny držáku. Plnohodnotný proplach dusíkem.	Ano	Ano	Podmínka
<b>Software</b> Součástí dodávky musí být řídicí software. Programové vybavení musí umožňovat měření křivek tání biomolekul kontinuálně při několika vlnových délkách a plynule měněné teplotě (continuous temperature ramping) mezi -10°C až 105°C. Software umožňující analýzu naměřených dat: Vyhlazování spekter, stanovení sekundární struktury proteinů z CD spekter, celkovou termodynamickou analýzu křivek teplotního skanu v termínech teplot fázových přechodů, van't Hoffových entalpií. Export dat do obecně sdílených formátů, např. „csv“.	Ano	Ano	Podmínka
Rozměry přístroje (V x Š x H) mm	Uvedte: rozměry	550 x 1500 x 600	Informativní
Hmotnost přístroje	Uvedte: hmotnost	60 kg	Informativní
Požadavky na napájení: 230 V	Ano	Ano	Podmínka
<b>Další požadavky</b>			
V dodávce budou obsaženy přístroje, příslušenství i spotřební materiál (který je součástí dodávky) ve verzi, která je pro daný typ výrobku aktuální (poslední)	Ano	Ano	Podmínka
Dodání na místo určení, instalace, uvedení do provozu a instruktáž součástí dodávky.	Ano	Ano	Podmínka
Zabezpečení servisu a případných preventivních prohlídek po celou dobu životnosti přístroje	Ano	Ano	Podmínka

# Quantitative Circular Dichroism

Chirascan *q*CD  
Chirascan-plus *q*CD

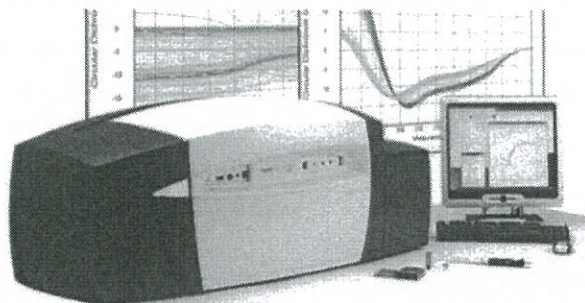


## Instrument Overview

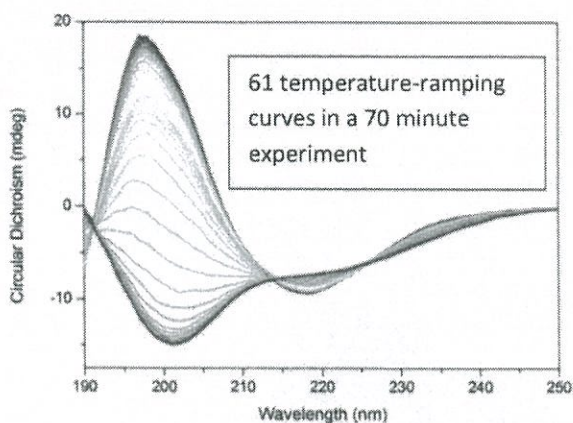
The new *q*CD series introduces a range of capabilities which increase performance and productivity and which, crucially, make CD spectrometry a truly quantitative technique.

The Chirascan range of CD spectrometers has long been the most sensitive and the most advanced available. We invite you to take a look at how the new *q*CD series can benefit your research - whether for scientific or pharmaceutical applications.

### CHIRASCAN *q*CD

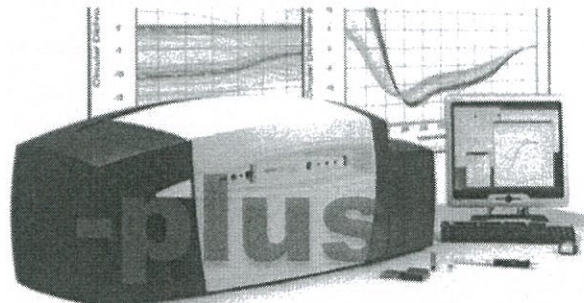


- Quantitative CD measurements. Absolute multi-point CD calibration using DichOS optical standard
- Outstanding long-term stability – uniquely specified as a function of temperature
- Highest sensitivity. Equivalent to a synchrotron in the 170 - 260nm wavelength range (detection range 163 – 950nm as standard)
- Multiple temperature-ramping curves in a single experiment - saving time and sample

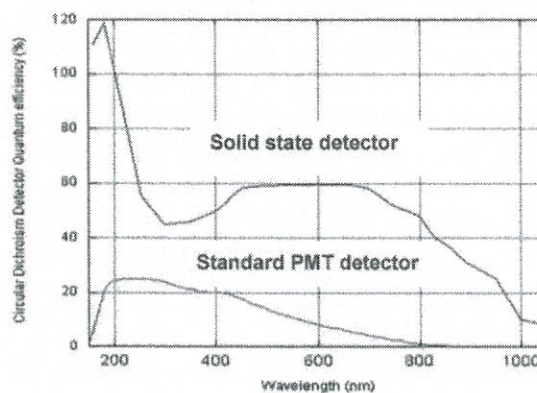


- ProData acquisition, display and analysis software (unlimited seats)
- Large range of unique upgrade options

### CHIRASCAN-PLUS *q*CD



- All of the capabilities of Chirascan *q*CD with even greater sensitivity
- Uses a solid-state detector with automatic variable gain to ensure optimised performance at each wavelength



- Detection range 163 - 1200nm as standard (extendable to 1700nm)
- Accurate simultaneous absorbance with CD
- Straightforward upgrade from Chirascan *q*CD
- Upgradeable to Chirascan-auto *q*CD

## What is $\epsilon$ CD?

$\epsilon$ CD redefines the applications of circular dichroism spectroscopy by including novel elements that, for the first time, enable quantitative CD measurements to be recorded

### Accuracy: factory calibrated with DichOS

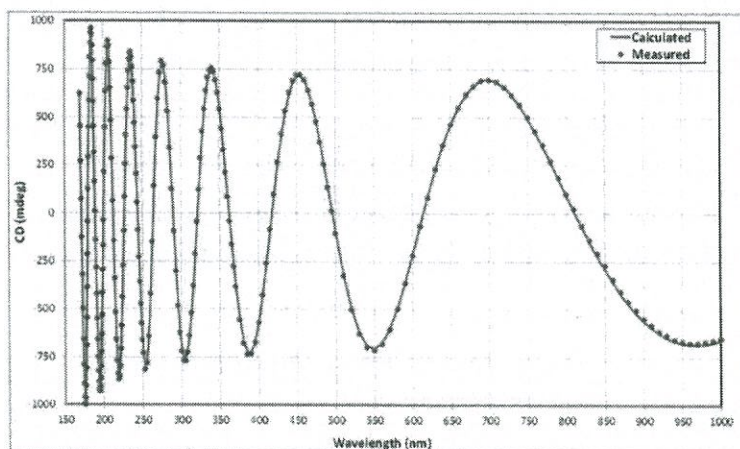
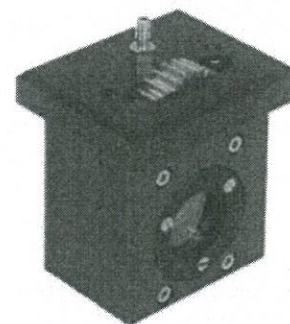
For the first time ever, CD spectrometers can be calibrated using an absolute standard and at multiple wavelengths.

Quantitative calibrated data allows users to properly assess the value of their CD measurements. The need for this was expressed by Knight et al<sup>1</sup> (of the National Physical Laboratory, UK) who reported that there was “...a lack of confidence in the CD technique, arising from an observed lack of comparability in the data obtained by different laboratories, or even different operators” and “we believe that the lack of an absolute reference or measurement traceability in circular dichroism contributes to a lack of confidence in the technique.”

CD spectroscopy is limited if researchers cannot quantify the precision and accuracy of their data. CD measurements with Chirascan  $\epsilon$ CD are accurate and so have more value because the user is able to properly address questions such as: is a measured difference in CD significant from my earlier results or from the results of my collaborator's lab? Similarly in the pharmaceutical industry, workers use CD for batch comparison, comparisons over time, and comparison at different manufacturing facilities - and they need to be able to quantify the data.

Inaccurate CD data has more limited value, and errors in batch comparison etc. can be costly. Referees and regulatory authorities are increasingly requiring statistically relevant data. In order to achieve this, CD data must be of known accuracy and also of known precision (precision is discussed in the next section).

DichOS (Dichroism Optical Standard) is a new, non-chemical, multi-point CD calibration standard that eliminates the uncertainties associated with conventional, single-point calibrations. DichOS enables measurement of *absolute* CD values and, with DichOS calibrated instruments, comparison of CD spectra measured on different instruments or at different times on the same instrument becomes routine. DichOS is constructed from optical components whose physical properties and tolerances are precisely characterised. This enables a model CD spectrum to be generated which is used to calibrate the spectrum measured with DichOS. A multi-point calibration curve is generated that is accurate to  $\pm 1\%$  at all wavelengths.



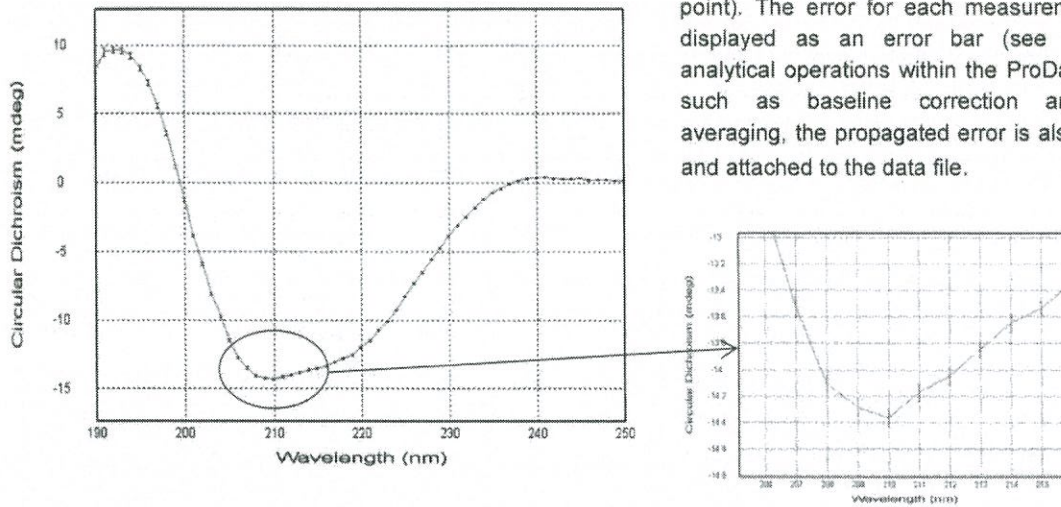
DichOS produces a CD spectrum comprising multiple peaks from the Far-UV to the NIR (see left). The model spectrum (red) can be calculated very precisely and this is compared with the measured spectrum (blue).

<sup>1</sup> Knight et al *International comparability in spectroscopic measurements of protein structure by circular dichroism: CCQM-P59. Metrologia*, 2010, 47, (1A), 08022

## What is CD?

### Precision: calculated errors are reported with every measurement made

The Chirascan *q*CD always acquires discrete CD measurements under the experimental conditions used. Filtered, or rolling average, measurements are NOT used as these are essentially a composite measurement of the CD signal at different wavelengths. With each CD measurement a standard error is also calculated (from the large number of samples recorded at each wavelength point). The error for each measurement can be displayed as an error bar (see figure). For analytical operations within the ProData software, such as baseline correction and spectral averaging, the propagated error is also calculated and attached to the data file.



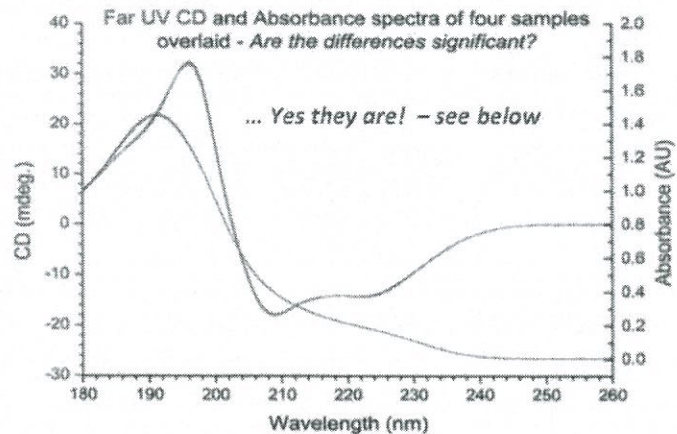
### Stability: improved CD stability

A key challenge for any CD spectrometer is to have minimal change in the CD signal as a function of temperature as this is the critical parameter limiting long term stability. *q*CD spectrometers have exceptionally high stability, especially with respect to changes in temperature. Applied Photophysics is alone in providing CD stability specifications as a function of temperature ( $\leq 0.01$  mdeg/ $^{\circ}$ C in the range 170nm to 650nm).

### Analysis: statistical (quantitative) comparison of higher order structures

***q*BIC Biocomparability Suite.** Comparing and quantifying differences in CD spectra requires measurements that are both accurate and of known precision; requirements that have been advanced by *q*CD. *q*BIC is a software option that enables a quantitative comparison of spectroscopic data by establishing whether differences between similar CD spectra are statistically significant. *q*BIC employs a number of approaches for numerically scoring spectrum similarity.

In the example shown (right) 4 CD spectra are overlaid (red spectra). They are of insulin and insulin spiked with 2.5%, 5% and 10% Lispro. To the naked eye these spectra appear identical. However statistical analysis using *q*BIC shows them to be significantly and quantifiably different. Two statistical methods were employed in the study summarised here. The results are shown in the table below:

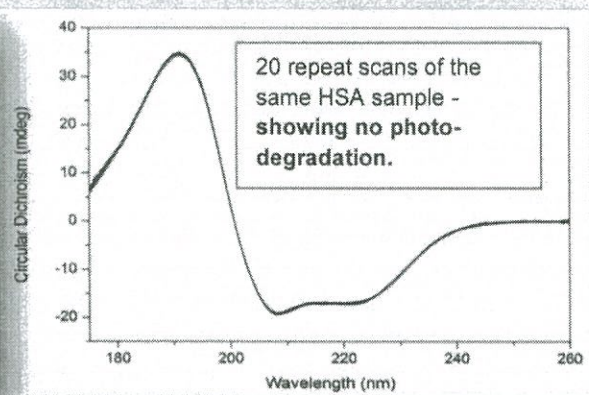
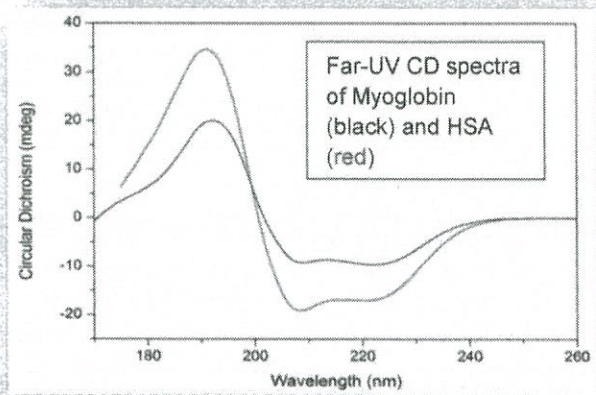


Human Insulin with % Lispro	P value	Z-score
0%	0.464	0.051
2.5%	0.0382	2.892
5%	0.0000428	7.694
10%	2.57E-08	21.04

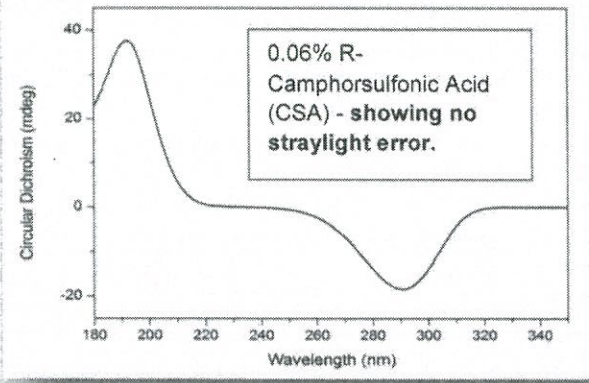
If  $p < 0.05$  = differences are significant at the 2-sigma (95%) confidence level or more.

If  $Z > 2$  = differences are significant at the 2-sigma (95%) confidence level or more.

## Spectral Performance



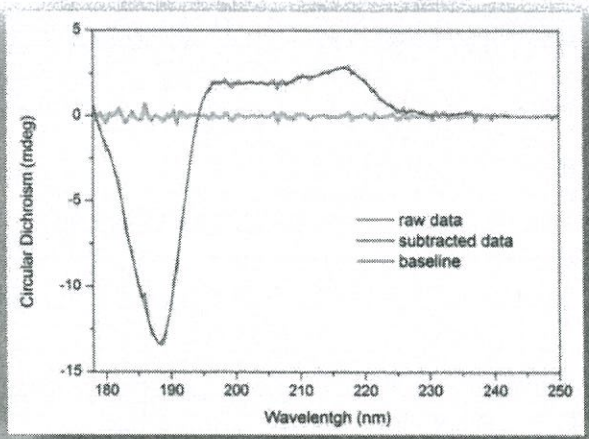
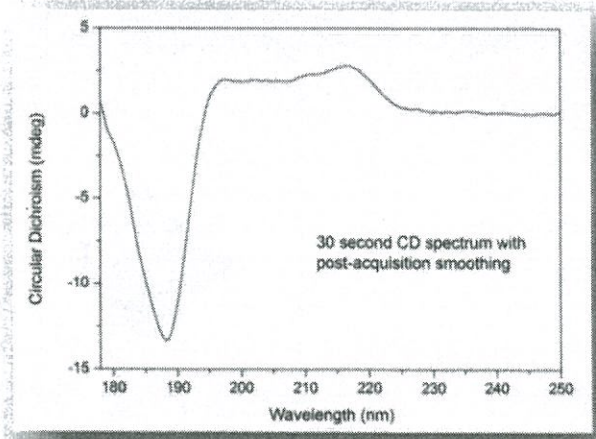
Chirascan *q*CD's unique dual polarising prism design means that it has far higher light throughput than other CD spectrometers, particularly in the far-UV region. Chirascan *q*CD CD spectra in the 170-260nm range are equivalent to what can be measured using a synchrotron beam line. Examples of protein spectra measured down to 170nm and 175nm are shown above.



The spectra above-right show that the higher light throughput on Chirascan *q*CD produces unsurpassed far-UV performance without photo-degradation of the sample. The CSA spectrum (right) is accurate in the far-UV indicating minimal stray light.

## NO Continuous Smoothing!

Each discrete wavelength point on a CD spectrum recorded on Chirascan *q*CD is the actual CD measurement at that wavelength. If required, Savitsky-Golay tools can be used to produce a smoother version of the spectrum - as shown below (left) for a particularly fast scan. This can be useful for cosmetic purposes but it should not be confused with the real CD measurements and it could not be used for statistical spectral comparisons. The figure below (right) shows the smoothed spectrum overlaid on the actual measured spectrum.

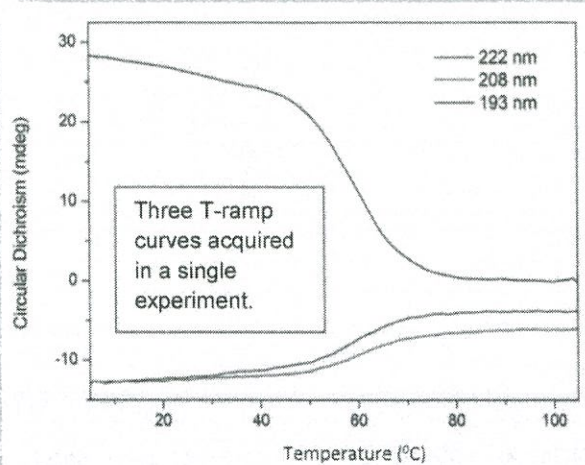


In contrast, a well-known CD manufacturer recommends a scan method where only smoothed CD spectra are recorded. It is not made clear that the recorded spectra have been smoothed using a rolling average and that the data file does not comprise discrete CD measurements at each wavelength. The true quality of the CD measurement cannot therefore be seen, and the user must also assume that the spectrum has not been over-smoothed. There is no practical reason for acquiring CD spectra in this way other than to disguise the true quality of the measurement. As shown above, CD spectra can always be smoothed after acquisition in a controlled way such that the user can see the effects of the smoothing process.

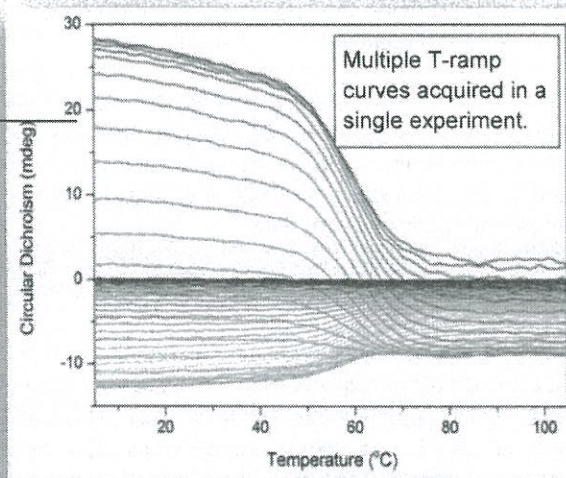
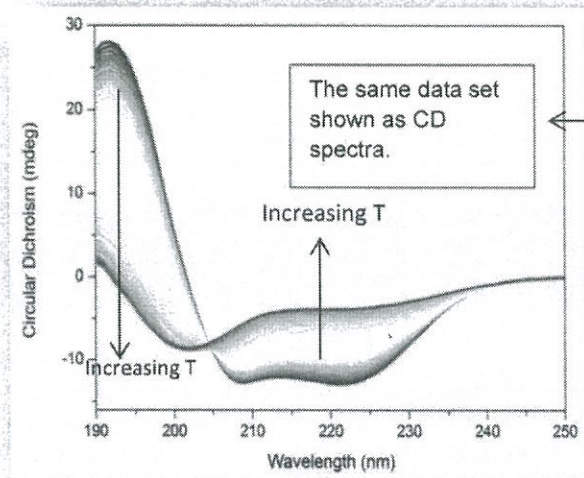
## Unique Thermal Ramping Capabilities

In a single continuous temperature ramping experiment, T-ramp curves can be acquired at multiple wavelengths. This is possible because the sample temperature is accurately recorded *with each CD measurement at each wavelength* using a temperature probe inserted in the sample. So a thermal ramping experiment could involve measuring:

- at single wavelength only
- at a few specific wavelengths; as in the example on the right where three T-ramp curves are recorded in a 90 minute experiment (ramping at 1°C/min).
- at multiple wavelengths; as in the example below-right which was recorded in a 90 minute experiment. This dataset can also be viewed as temperature-dependant CD spectra (below-left).



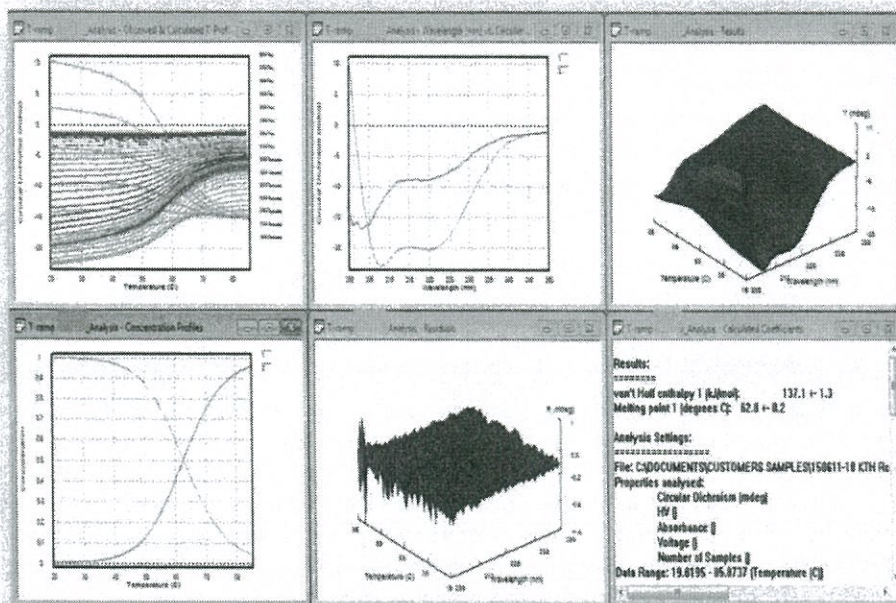
One experiment can provide information on both stability *and* structure. Furthermore, absorbance spectra vs. temperature are recorded simultaneously which provides information on aggregation onset. Emission spectra can also be acquired in the same experiment using the CCD emission spectrometer accessory (see page 7).



## Global Thermodynamic Analysis Software

**Global 3** thermodynamic analysis software has been developed specifically for fitting multi-wavelength spectroscopic data measured as a function of temperature.

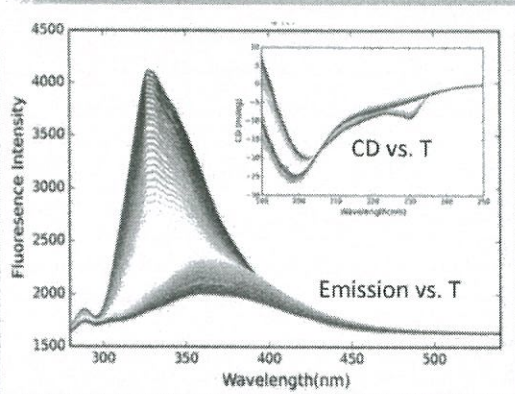
**Global 3** determines mid-point temperatures of transition, Van't Hoff enthalpies, as well as the CD spectra of short-lived transition intermediates, and the concentration vs. time profiles of all contributing species in the thermal transition.



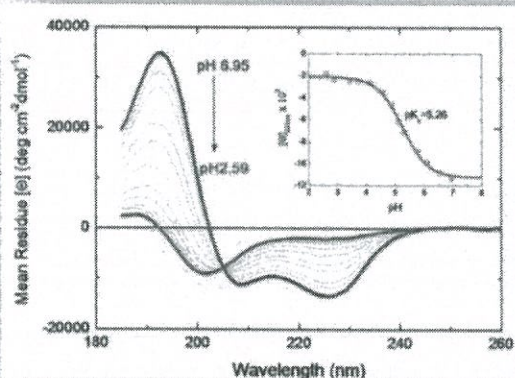


## Accessories and Upgrades

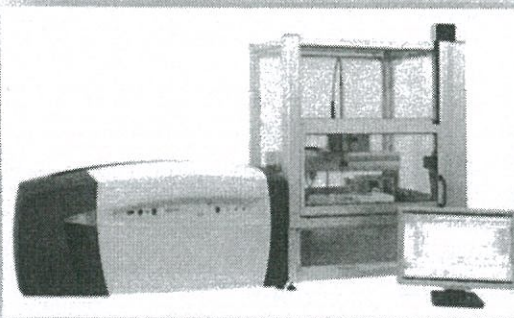
- **NEW CCD Emission Spectrometer.** With this accessory, CD, absorbance and emission spectra can be acquired in a single ~70 minute thermal denaturation experiment (stability of secondary and tertiary structure monitored in a single experiment).



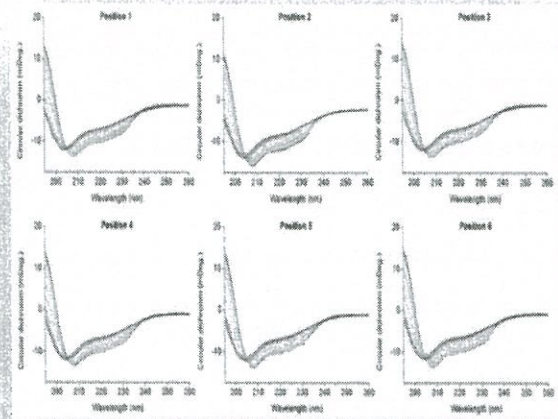
- **Auto-Titrator and pH Meter.** The auto-titrator can also be used with an in-situ pH probe/meter.



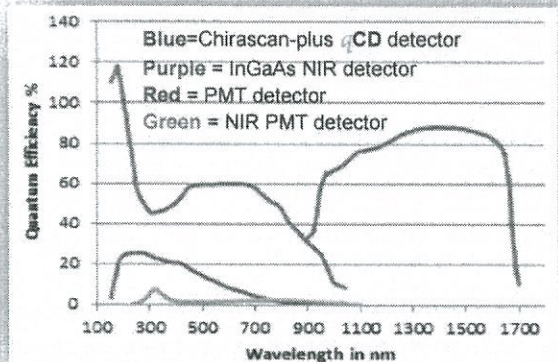
- **Linear Dichroism Couette Cell.** Highest shear rate and highest homogeneity of shear (just 11% variance across the gap). A CD cell holder can also be fitted for rapid switching between CD and LD measurements.
- **Chirscan-auto  $\theta$ CD.** Upgrade to a fully automated system integrated to an XYZ robot. Transforms productivity and eliminates human error. Contact us for full information on **Chirscan-auto  $\theta$ CD.**



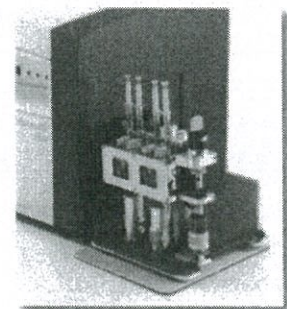
- **Six-Cell Holder.** The data below shows 6 thermal denaturation CD spectral datasets acquired in one experiment using the 6-cell holder. For this experiment, the same sample was used in each cuvette. The measured  $T_m$  was  $72.7^\circ\text{C} \pm 0.1^\circ\text{C}$ .



- **NIR Detection to 1700nm.** Just two Chirscan-plus  $\theta$ CD detectors are required for the range 165-1700nm - both use automatic variable gain to ensure optimised performance at each wavelength.



- **Stopped-flow.** Combines the highest sensitivity with the lowest dead-time. The stopped-flow unit is designed specifically for use with Chirscan  $\theta$ CD and the whole system sits on the bench-top. As a further option, the stopped-flow unit can also be used as a separate stand-alone instrument with its own light source, PC etc. Applied Photophysics is the world's leading supplier of stopped-flow instrumentation.



- **Other accessories include** integrating sphere, thin film/KBr disc holder, ORD detection, dedicated fluorescence/anisotropy detector, scanning emission monochromator, magnetic CD, low temperature cryostat, customised cells/cell-holders, 21CFR Part II compliance software, IQOQPQ Validation Service.

## Key Specifications

	Chirascan <i>q</i> CD	Chirascan-plus <i>q</i> CD
CD calibration & accuracy	Multi-point calibration ( <b>DichOS</b> ) - accuracy to within $\pm 1\%$	
Light Source	150W air-cooled Xenon arc lamp	
Monochromator	Dual prism, BOTH prisms polarising	
Wavelength range	163nm to 950nm (+ NIR detector option available)	163nm to 1200nm (extendable to 1700nm)
Standard detector	Photomultiplier	Photodiode (with automatic variable gain)
Standard detection modes	CD, absorbance. Also suitable for fluorescence, anisotropy, FDCD, LD	
Detection Channels	5 as standard: CD, absorbance, detector HT, DC voltage and temperature	
Sensitivity. <i>Typical RMS-noise values with no sample in place for a 1nm Bandwidth, 2 second D.I.T. (with no smoothing, no rolling averaging)</i>	0.07mdeg @ 175nm 0.03mdeg @ 180nm 0.03mdeg @ 185nm 0.03mdeg @ 200nm 0.03mdeg @ 250nm 0.04mdeg @ 500nm 0.09mdeg @ 750nm	0.04mdeg @ 175nm 0.02mdeg @ 180nm 0.015mdeg @ 185nm 0.02mdeg @ 200nm 0.02mdeg @ 250nm 0.02mdeg @ 500nm 0.03mdeg @ 750nm 0.05mdeg @ 1000nm
CD precision measurement	Calculated error is reported for each wavelength point on the spectrum	
Stray light	< 3ppm at 200nm	
Baseline stability	$\leq 0.01$ mdeg/ $^{\circ}$ C (170nm to 650nm)	
Temperature ramping	Able to acquire thermal denaturation curves at multiple wavelengths in one continuous temperature-ramping experiment	
Nitrogen purge requirement at 170nm	5 litres/min	
Nitrogen purge & lamp ignition control	Software control of N2 purge and lamp ignition Pre-set /auto start-up of N2 purge and lamp ignition Pre-set switch off of N2 purge and lamp Automatic lamp switch off when N2 flow drops (fail-safe)	

**Other Standard Features:** Peltier temperature control, external temperature probe, advanced scanning and kinetic acquisition modes, ProData Viewer data display and analysis tools including: fitting of thermal ramping curves, kinetic analysis, secondary structure analysis, and unlimited licence to install ProData Viewer on other PCs. USB communications.

**A wide range of accessories and upgrades are available including** global thermodynamic analysis, CCD emission spectrometer, LD Couette cell, 6-cell autochanger, titration unit, pH meter, stopped-flow unit, thin film & KBr disc holder, integrating sphere, dedicated fluorescence & anisotropy detectors, scanning emission monochromator, cryostat, ORD detection, magnetic CD, customised cells / cell-holders, 21CFR Part II compliance software and IQOQPQ Validation Service.

## Free Direct Evaluation – put *q*CD to the test!

We invite researchers to visit our demonstration labs, or to send us samples, to run on the Chirascan and/or Chirascan-plus *q*CD spectrometers. We have demonstration labs at our factory in **London, UK** and in **Boston, USA**.

**Applied Photophysics Limited**  
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Tel (UK): +44 1372 386 537  
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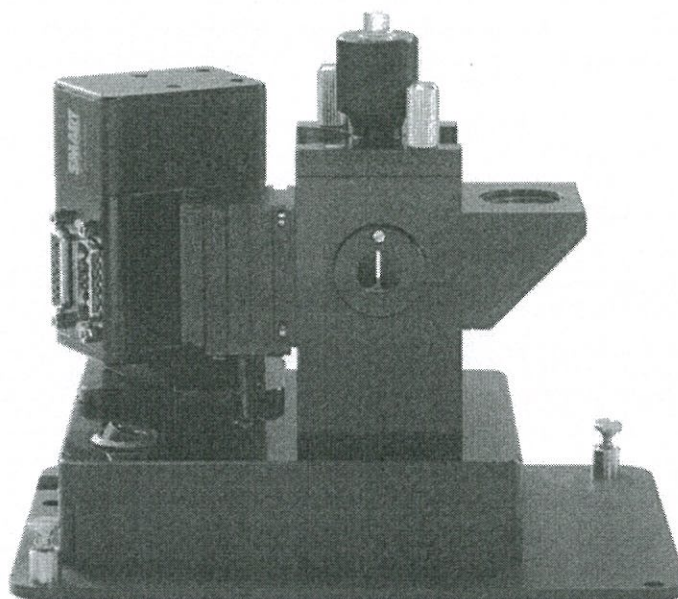
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[www.photophysics.com](http://www.photophysics.com)

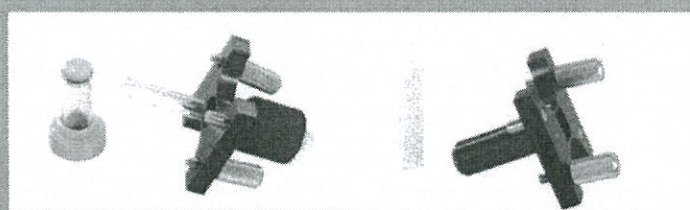
**AppliedPhotophysics**  
More Time for Science

TECHNICAL DATASHEET

Chirascan High-Shear Couette Cell  
Accessory (CCA)



Linear dichroism (LD) is a powerful method for investigating macromolecular structure and interactions, including DNA-ligand binding, peptide or protein orientation in membranes, fibrous proteins and other polymer structures. At the heart of the Chirascan CCA lies a Couette cell which exerts a precise and homogeneous shear rate on a low volume liquid sample using concentric quartz cylinders. Superb macromolecular alignment, access to very high shear rates and precision control work in synergy to enable scientists to push the boundaries in these important fields of research.



- ▶ Superior shear rates enable complex biological systems to be studied
- ▶ Flexibility: easily replace the Couette cell with a standard CD cell for comparative work
- ▶ Excellent shear rate uniformity: shear rate applied is accurate within a small defined range
- ▶ Illuminated viewing port for *in-situ* inspection of sample
- ▶ Simultaneous measurement of LD (or CD) and Absorbance: get more data in the same experiment and save time
- ▶ Full nitrogen purging for access to far-UV wavelengths, typically to 180nm
- ▶ No physical reconfiguration required to switch between LD, CD and Absorbance modes
- ▶ Simple cell removal for easy cleaning

TECHNICAL DATASHEET

Chirascan High-Shear Couette Cell Accessory Technical Specifications

Shear rate range	0 to 10,200s <sup>-1</sup>
Wavelength range	180nm to 850nm (Chirascan™), 180nm to 1150nm (Chirascan™-plus)
Sample volume	250µL
Measurement modes	LD with simultaneous Absorbance, CD with simultaneous Absorbance
Purging	Enclosed light path for efficient purging and access to the far-UV
Temperature control	Programmable water circulator (option); close-coupled thermocouple; 5°C to 95°C

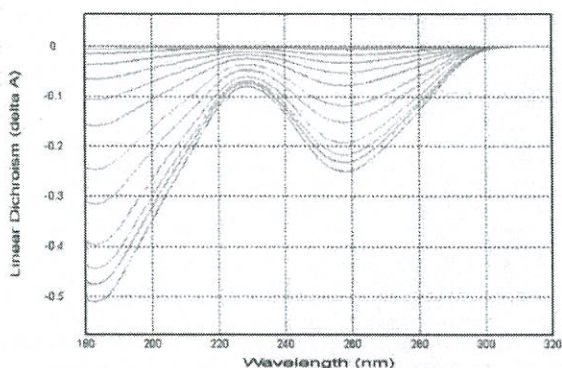


Figure 1. LD spectra of DNA down to 180nm and shear rates from 10 to 10,200s<sup>-1</sup>.

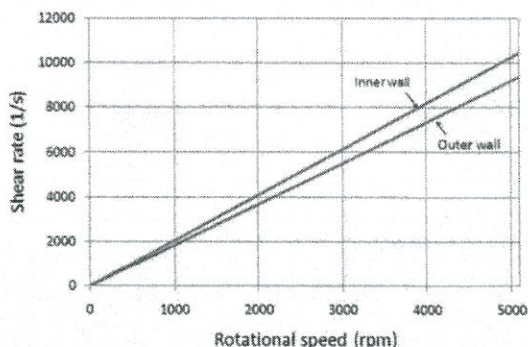


Figure 2. Shear rate at the inner and outer walls plotted against the rotational speed in rpm.

The Chirascan CCA exploits a precisely engineered narrow gap design and a high precision stepper motor to offer unparalleled shear rates, shear rate control and uniformity. Innovative design enables the user to obtain CD and Absorbance spectra in a conventional cuvette without the need to remove the entire Chirascan CCA. In addition, a convenient illuminated viewing port allows visual inspection of the sample *in situ* for peace of mind.

Typical applications

- ▶ Linear dichroism (LD) of flow-oriented DNA
- ▶ Orientation of peptides or proteins in a lipid membrane
- ▶ Changes in macromolecular structure as a function of shear rate
- ▶ DNA ligand interactions
- ▶ Linear dichroism (LD) of protein fibrils
- ▶ Temperature induced changes in ligand binding and orientation

For more information about how the CCA could be used in your research contact us at [info@photophysics.com](mailto:info@photophysics.com)

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The technical specifications provided in this datasheet are for general information purposes only. They may be subject to change at any time without prior notice.

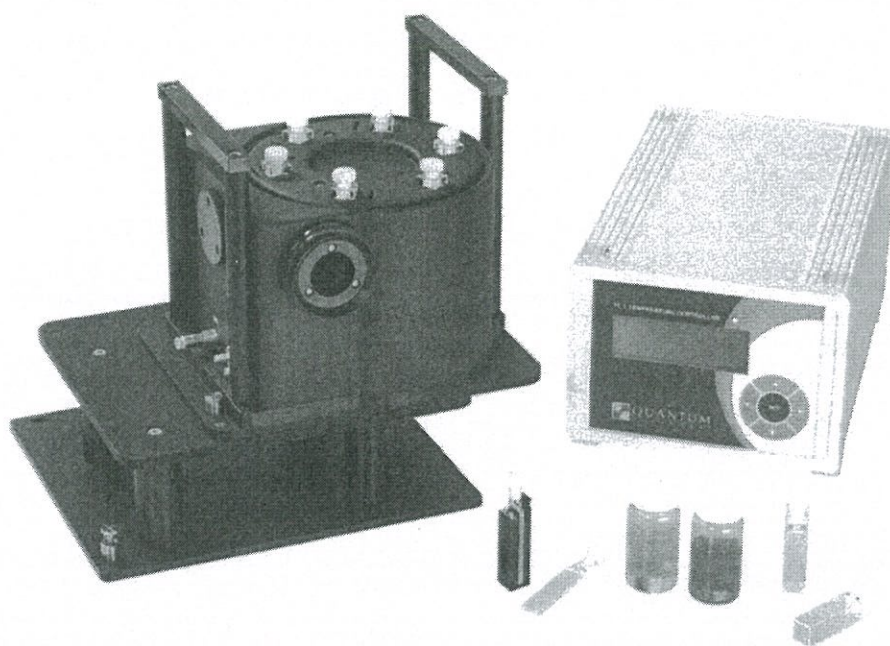
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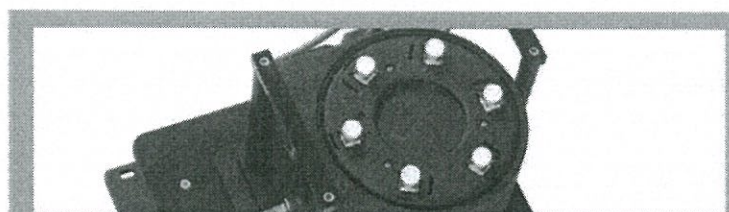
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More Time for Science

TECHNICAL DATASHEET

Chirascan™ 6-Cell Peltier Cell Holder



The 6-Cell Peltier cell holder increases productivity for both spectral and temperature ramping applications. The carousel design enables fully automated measurement of up to six samples, as well as simultaneous measurement of CD, absorbance and fluorescence. A sealed light path design ensures that the nitrogen environment is not compromised when the sample chamber is opened to replace sample cuvettes. This increases productivity and ensures that the absorbance measurements, acquired simultaneously with the CD measurement, are of the highest possible accuracy. Temperature ramping experiments between  $-20^{\circ}\text{C}$  and  $+110^{\circ}\text{C}$  can now be performed on up to 6 samples in a single experiment.



- ▶ Automated data collection across 6 samples
- ▶ Sample stirring at all 6 positions
- ▶ Compatible with all Chirascan™ data collection modes: CD, Absorbance and Fluorescence
- ▶ Fully integrated into the Chirascan™ control software and data analysis software
- ▶ Integrated Nitrogen purge for data collection in the far-UV
- ▶ Easy to install and remove from the Chirascan™ sample chamber
- ▶ Precision temperature control allowing temperature ramp experiments (continuous and stepped)
- ▶ Available as an upgrade for older Chirascan™ models

TECHNICAL DATASHEET

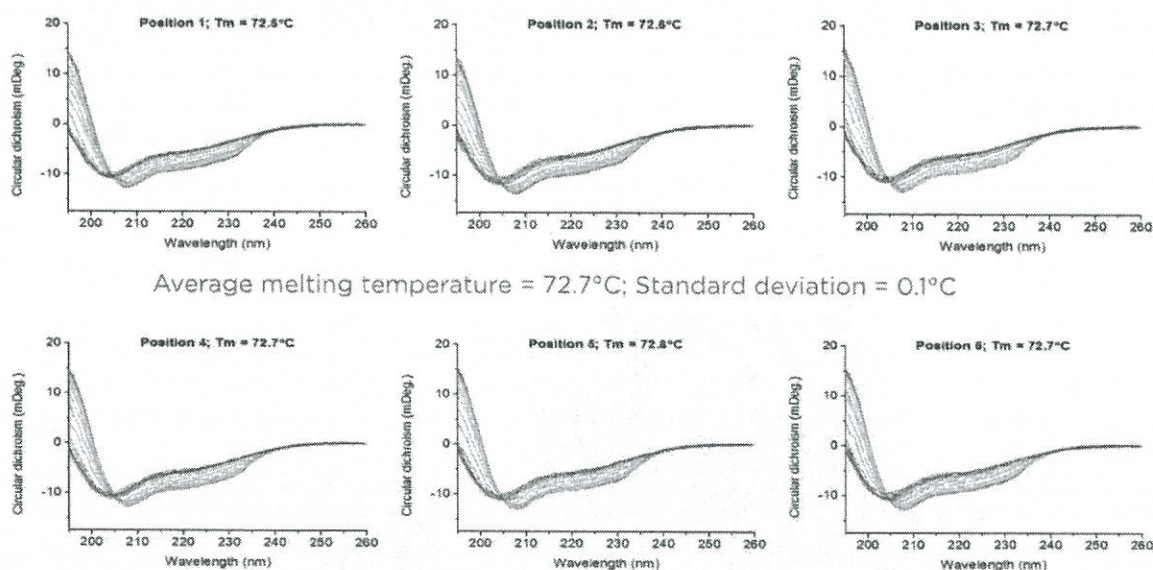


Figure 1. CD spectra acquired during thermal denaturation of identical lysozyme solutions in 6 cells of 0.5mm pathlength (25 to 94°C) in a continuous temperature ramping experiment. Melting temperatures ( $T_m$ ) are derived from global analysis of the data. These data are not smoothed.

Technical Specifications

Temperature controller	Quantum Northwest TCI
Type	Carousel
Sample positions	6
Temperature range	-20°C to +110°C
Temperature precision	±0.02°C
Temperature accuracy	0.25°C from -20°C to +110°C
Cuvette size (outside dimensions)	12.5mm x 12.5mm
Minimum cuvette height	30mm
Magnetic stirring speed	1-2500 rpm
Cuvette Z height	15mm
Optical port dimensions	12mm high x 10mm wide (can be reduced with a mask)
Ramping modes	Stepped or continuous

Temperature ramping experiments demand reproducible presentation of the sample to the measuring beam and uniform temperature control across all sample positions. The high reproducibility of the presented data demonstrates that the 6-Cell Peltier cell holder achieves these essential characteristics.

Typical applications

- ▶ Formulations: Buffer screening experiments to optimise conditions (pH, ionic strength, presence of detergents, etc.) for stabilising biotherapeutics
- ▶ Biosimilarity: Statistical comparison of similar protein based biotherapeutics
- ▶ Protein engineering: Conformational stability/comparison studies

For more information about how the 6-Cell Peltier cell holder could be used in your research contact us at [info@photophysics.com](mailto:info@photophysics.com)

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# CHROMSPEC

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## Položkový rozpočet:

Výzkumný ústav veterinárního  
lékařství, v. v. i.  
Mgr. Jiří Kohoutek, Ph.D.  
Hudcova 296/70  
621 00 Brno

### Chirascan - Plus qCD

Pol.	Objednací číslo a popis	Poč.	Jednotková cena	Celková cena
1	<b>CS/3D</b> Chirascan-plus qCD high-performance CD spectrometer výkonný qCD spektrometr plně ovládaný z PC. Včetně PC.	1	2 049 800,00	2 049 800,00
2	<b>CS/PC6</b> Rectangular 6 position Peltier cell auto-changer Chirascan 6-Cell Peltier	1	321 420,00	321 420,00
3	<b>PS/240</b> Thermostatted water recirculator, 240V	1	38 240,00	38 240,00
4	<b>CS/CCA</b> Couette Cell for Linear Dichroism Studies.	1	355 200,00	355 200,00
5	<b>GLOB3 - Global 3 (3 licenses).</b> Unikátní sw pro globální thermodynamickou analýzu dat signálu při několika vlnových délkách vs. teplota (Tm, Cm a van't Hoff entalpie).	1	16 770,00	16 770,00
6	<b>DichOS CD Calibration.</b> Absolutní CD kalibrace.	1	0,00	0,00
7	<b>ANMS Active Nitrogen Monitor System</b> Softwarově řízený N2 proplach a zapnutí lampy.	1	0,00	0,00
8	<b>Pro-Data Windows™ software</b> Pro ovládání přístroje, získávání dat, jejich prezentaci a	1	0,00	0,00
9	<b>Secondary structural analysis software (CDNN):</b>	1	0,00	0,00
10	<b>AP/CSCH5_1.PCM Rectangular cell holder</b> Adaptér pro kyvety s optickou drahou 1 mm a 0,5 mm	6	6 145,00	36 870,00
11	<b>CS/110-1-40 1mm lightpath</b> Křemenné kyvety, optická dráha 1 mm.	6	8 120,00	48 720,00
12	<b>CS/IT2 - Installation and training</b> Instalace a zaškolení obsluhy v rozsahu 2 dnů.	1	61 780,00	61 780,00
13	<b>CS/PSI2 - Packing shipping and Insurance</b> Balné, doprava a pojištění.	1	20 000,00	20 000,00

**Celkem bez DPH: 2 948 800,00**

Sazba DPH: 21 % 619248,00

Celkem v Kč, místo určení, včetně DPH: 3 568 048,00

