

Spectrophotometer with excellent repeatability accuracy



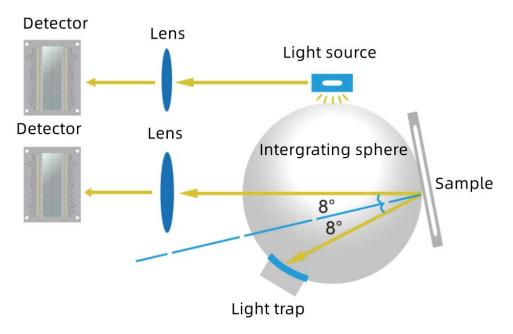
Ultra-high repeatability accuracy: $dE^*ab \le 0.02$ (DS-660)



1. Spectrophotometer Technology Introdution

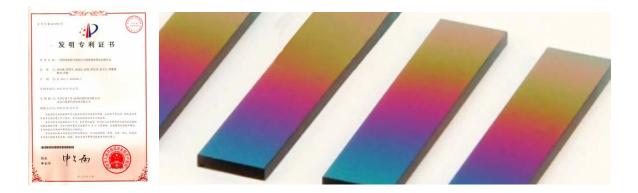
(1) Dual optical path design improves repeatability into $dE^*ab \le 0.02$ (DS-660)

The dual optical path design monitors light source energy fluctuations while measuring the sample signal, reducing interference during measurement, obtaining higher measurement stability and improving the instrument's measurement repeatability index to $dE^*ab \le 0.02$. This ensures the instrument, high standards of measurement speed, accuracy, stability and inter-stage difference consistency. The relevant technology is protected by a Chinese invention patent and a US invention patent.



(2) Innovative 5 micron thick nano-integrated optics

Innovation is the soul of CHNSpec. After nearly 10 years of dedicated research, CHNSpec has adopted nano-integrated optics as the spectroscopic device, which can achieve nano-level spectroscopic capability with only 5 micron thickness of optics, once again leading the direction of innovation in the industry, crossing the technological blockade of foreign products and greatly enhancing the technical performance of the products. The relevant technology is protected by Chinese invention patents.





Related techniques were published in the Chinese famous optical academic journals "Journal of Optics" and "Journal of Photonics"

"Optimized Design of Spectrophotometer Based on Real-Time Dual Optical Correction" "The Design of SCE Measurement Gloss Correction Model for Color Measurement Instruments Based on D/8 Geometry"

- The technology is protected by a Chinese invention patent Colour measuring instrument and implementation method based on D/8 geometry for light trap error correction CN201310373360.1 A colorimeter for measuring the colour of objects using linear variable filters CN201310027285.3
- Related technologies are protected by US invention patents: • SPECTROPHOTOMETRIC COLORIMETER BASED ON LED LIGHT SOURCE AND METHOD FOR REALIZING THE SAME US9243953B1
- The relevant technology won the third prize of Science and Technology Progress of Zhejiang Province and the Excellent Product Award of China Instrument Society





第45 卷第 7 期 2016 年 7 月 光子学根 ACTA PHOTONICA SINICA 第 33 委 第 11 期 2013年11月 光学学报 ACTA OPTICA SINICA foi:10,3788/gzx120164507,0712002 基于实时双光路校正的分光测色仪优化设计 袁琨^{1,2},张淑琴¹,吴逸萍²,金尚忠¹ (1 中国计量学校 大学与电子科技学校,杭州 310018) (2 杭州斯霍科技有限公司,杭州 310016) 用量:反射光谱:双光路:分光褐色仪:光学结构:算法优化:实时校正 M.38.2 文献标识码:A 文章编号:1004-421

Optimization Design of Spectrophotometer Based on Real Time Calibration of **Dual Optical Path**

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I double-heam structure in spectrophoton e in the design of the double-beam to calibe f customised experiments at at different ambient temperatures was ev-har when operated in an environment with a temperature charge to protection instrument is able to produce measurements repeatability. It is is less than or equal to 0.03, and the maximum is less than or equa 基于 D/8 条件的颜色测量仪器 SCE 测量光泽 修正模型的设计

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对表面无评定较高的物体表面描色进行测量。按某周提射照明。\$P根原母。前除值面反射光的几何等 端就则反射光,因于光时的尺寸,大小的不同,寻放不同结构) 自器间差,从难论上分析了使射照明,3°观察角,消除能策反射; 原因,设计了一种可以最有位本能如反射+(SC1)和主能语)

Gloss Modification Model Design of SCE Measurement Based on D/8 Condition Color Spectrophotometer

n Kun^{1,1} Yan Huimin¹ Jin Shangzhong² Cen Songyuan² Wang Ji Key Laboutny of Madem Optial Introverst, Zhejiang University, Hangdom, Zhejiang 310077, 4 or Obaid and Editerini Tatabades, Chin Ulian University, Handraha, Zhejiang 20018, C

artic conditions of diffuse Hamiltanian, \mathbf{P}' observation, and specific light cmemory the articles order. The SCE condition is smallly smaller by strike the tork the air of description \mathbf{P}_{n} different measurement into generate many the measurement of sample with different algorithm through the different measurement of generations in adaption of the different systemic generation generations in adaption of the different distances of precisive light inclusions (CCI) results simulatores \mathbf{P}_{n} . The means systemic generation of the different distances \mathbf{P}_{n} . The distance systemic generation of the different distances \mathbf{P}_{n} . The distance system distance system distance distances \mathbf{P}_{n} . The distance distance distance distances \mathbf{P}_{n} and \mathbf{P}_{n} are distance distances distances and the distance distances \mathbf{P}_{n} . The distance distances dist inclusions, the SCE measuring result tas-results show that the modified structures, and is very replications. Key words: measurement, color measurement, OCIS codes: 120,2440, 120,4640, 120,5240

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2. Product features

(1) Ultra-high repeatability accuracy: dE*ab ≤ 0.02 (DS-660) Repeatability accuracy is an important indicator to describe the accuracy of spectrophotometers. The DS600 series spectrophotometers are evaluated on the basis of a rigorous standard of repeatability, which is unmatched by any other spectrophotometer in its class.



(2) Excellent Inter-instrument Agreement

The superior level of technology and craftsmanship ensures that the DS600 series has excellent inter-instrument agreement. The use of BCRA series standard colour tiles for colour transfer and colour value traceability guarantees an excellent level of inter-instrument agreement.

(3) Calibration base and zirconium reference with a Mohs hardness of 9 to calibrate the instrument, ensuring long-term stability

Compared to existing products, the DS600 series spectrophotometer does not require frequent manual calibration when in use. Simply place it on the calibration base and the instrument will automatically calibrate the overall instrument function and accuracy according to its own state and environmental factors, ensuring that the instrument is always in a stable state and ready for use.

The white tile in the calibration base is the basis of the instrument's work. Through long-term investment and research, CHNSpec has integrated the "artificial diamond" zirconium material as the calibration white tile, with a Mohs hardness of 9. As the material itself has the hardness and stability comparable to diamond, the surface of the calibration white tile will not be scratched and will not change colour with changes in temperature and humidity. This is a further improvement in the stability and durability of the calibration whiteboard compared to similar foreign and domestic



products that use common industrial ceramics or even plastic as calibration whiteboards, ensuring the performance of the instrument.



Calibrated white tile (artificial diamond zirconium material)

- Mohs hardness: 9
- Spectral reflectance >90%
- No discolouration due to changes in temperature and humidity
- No discolouration by oxidation
- Ultra-high strength without scratching

(4) The DS600 series supports 3 measuring apertures for selection (DS-620 & DS-660)

To facilitate the measurement of samples of different sizes, the DS600 series spectrophotometer supports three apertures Φ 11mm, Φ 6mm and 1*3mm, which can be flexibly applied to a variety of different usage and testing conditions.

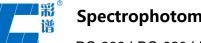


(5) Over 30 measurement parameters and nearly 40 illuminants available

The DS600 series spectrophotometers offer 30+ measurement parameters such as spectral reflectance, CIE-Lab, CIE-LCh, ΔE^*ab , opacity, whiteness, yellowness, etc.; and nearly 40 evaluation light sources to choose from such as A, B, C, D50, D55, D65, etc., covering almost all colour measurement indicators and illuminants in the industry.

(6) Built-in HD camera to see the measurement area clearly (DS-620 & DS-660)

The DS600 series spectrophotometer can obtain an image of the measured area through the camera when measuring, which can clearly locate the measured area of the sample and avoid inaccurate measurement due to wrong area.



CHN Spec

Spectrophotometer **DigSpec**[®]

DS-600 | DS-620 | DS-660



(7) Support WeChat applet, Android, Apple, Hongmeng mobile APP (DS-620 & DS-660)

- The DS600 series spectrophotometers can be connected to a variety of mobile phones via the mobile app.
- Users no longer have to pass on the colour values of samples and physical objects, they can easily pass on colour data via WeChat.
- Users can find the most similar colours in multiple sets of colour cards.
- Users can create personal colour databases and enter information on colour cards for printing, paint and textiles. The colour libraries created can be uploaded to the cloud for easy colour processing with data sharing across multiple devices.
- Business users can create and manage their own colour card information library and colour recipes in the cloud, and share the information library and colour recipes to their own users through a unique invitation code.



WechatApp



APP Mobile APP

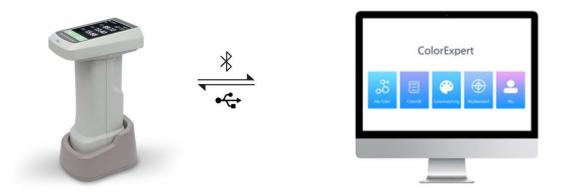


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Check color card number	Set standard with color	Share color data	creat individual color libra

(8) Use the powerful PC-based colour management system ColorExpert*

The DS600 series spectrophotometer comes with free PC software, ColorExpert, which connects to the DS600 series spectrophotometer via Bluetooth or USB cable.

ColorExpert is a full-featured colour QC software with four functional modules: My Color, Color QC, Colour Matching and My.



In 'My Color', users can collect or create their own colour library from hundreds of other users' own shared colour libraries. The PC software and mobile app can share accounts and the colour library data follows the account to synchronise information between PC and mobile.

In 'Color QC', the user can calibrate, measure and set up the spectrophotometer via the PC software. The user can use colours from the cloud database as standard to measure colour differences, view spectrograms, colour difference graphs, sample data and export the desired data test reports.



Spectrophotometer **DigSpec**[®]

DS-600 | DS-620 | DS-660

In "Colour Matching", the user is with a more convenient and efficient colour matching process. After the colour of the sample has been measured by the instrument, the system calculates the recipe in the recipe center and automatically fixes the colour to achieve an accurate match. The system is suitable for computerised automatic colour matching applications in the paint, coating, printing and textile industries.

In "My", the users can edit their personal information, search for or delete connected instruments, manage downstream users and manage the colour library shared with downstream users.

- * Part of function need to pay.
- 3. Function difference







DS-600	DS-620		DS-660	
Model	DS-600	DS-620	DS-660	
Test Mode	SCI	SCI+SCE	SCI+SCE	
Repeatability	≤0.04	≤0.03	≤0.02	
Inter-instrument Agreement	≤0.4	≤0.3	≤0.2	
Aperture	Single aperture	Three apertures	Three apertures	
UV light source	×	\checkmark	\checkmark	
Camera function	×	\checkmark	\checkmark	
Mobile App	×	\checkmark	\checkmark	
PC software	\checkmark	\checkmark	\checkmark	

4. Technical Parameter



Spectrophotometer DigSpec®

DS-600 | DS-620 | DS-660

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Product model	DS-600	DS-620	DS-660	
Geometry Test Mode	D/8,SCI	D/8,SCI+SCE		
Repeatability	dE* _{ab} ≤0.04	dE* _{ab} ≤0.03	dE* _{ab} ≤0.02	
Inter-instrument Agreement	dE* _{ab} ≤0.4	dE* _{ab} ≤0.3	dE* _{ab} ≤0.2	
Display Resolution		0.01		
Test Aperture	Ф11mm	Φ11mm, Φ	6mm &Ф3mm	
Color Spaces and Indices	Reflectance, CIE-Lab, CIE-LCh, HunterLab, CIE Luv, XYZ, Yxy, RGB, Color difference(ΔE*ab, ΔE*cmc, ΔE*94,ΔE*00),WI(ASTM E313-00,ASTM E313-73,CIE/ISO, AATCC, Hunter, Taube Berger Stensby), YI(ASTM D1925,ASTM E313-00,ASTM E313-73), Blackness(My,dM),Color Fastness, Tint,(ASTM E313-00),Color Density CMYK(A,T,E,M), Milm, Munsell, Opacity, Color strength			
Illuminant	A,B,C,D50,D55,D65,D75,F1,F2,F3,F4,F5,F6,F7,F8,F9,F10,F11,F12,CWF,U30,U35 ,DLF,NBF,TL83,TL84,ID50,ID65,LED-B1,LED-B2,LED-B3,LED-B4,LED-B5,LED-B H1,LED-RGB1,LED-V1, LED-V2			
Light Source	LED	LED LED+UV Visual Camera Auto calibration		
Measurement observation method	Visual			
Calibration				
Software support	Windows Andriod,iOS,Windows			
Observer	2°, 10°			
Integrating Sphere Diameter	40mm			
Standards	CIE No.15,GB/T 3978,GB 2893,GB/T 18833,ISO7724-1,ASTM E1164,DIN5033 Teil7			
Ways of spectral	Nano-integrated spectral devices			
Sensor	Silicon photodiode array Dual 16-group			
Wavelength interval	10nm			



DS-600 | DS-620 | DS-660

Wavelength range	400-700nm (user viewable reflectance at 31 wavelengths)		
Reflectance Range	0-200%		
Reflectance resolution	0.01%		
Measurement Method	Single measurement, average measurement (2 to 99 measurements)		
Measurement Time	1 second		
Interface	USB USB, Bluetooth		
Screen	Screen Full Colour Screen, 3.5 inches		
Battery	8,000 continuous measurements on a single charge		
Light Source Lifetime	10 years and 1 million tests		
Instrument Size	95 x 129 x 215mm (L x W x H)		
Language	Chinese & English		
Storage Memory	10,000 pcs of sample Instrument :10,000 pcs of sample ; APP: mass storage		

* Diffused illumination / 8° viewing with specular component included / specular component excluded

** When a white tile is measured 30 times at 5-second intervals after white calibration

***BCRA Series II average of 12 colour tiles measurements

5. Packing List of Portable Spectrophotometer



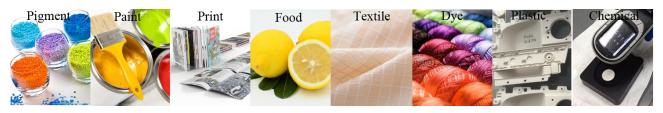
Qty.	Name	Qty.	Name



1	Main Instrument	1	USB Cable
1 European /American Plug		1	U-disk (PC software)
1/3	Apertures *	1	Operating Manual
1	Verification Certification	1	Charge and Calibration Base
1	White Packing Box		

*DS-600 is 1 aperture. DS-620 and DS-660 is with 3 apertures

5. Application of Portable Spectrophotometer



6. Warranty of Portable Spectrophotometer



- 1). One year warranty.
- 2). The instrument comes with verification certification to ensure the authority of the test result.