

To: 中国巨石

配置方案

2024-01-08

Renishaw Micro-Raman Spectroscopy System /雷尼绍显微共焦拉曼光谱仪

1 Renishaw inVia Spectrometer System for Raman spectral analysis using visible excitation at 405nm. Including: 雷尼绍inVia拉曼光谱仪基本配置, 激发波长405nm, 包括:

1.1 Spectrometer/主机

Stigmatic single pass spectrograph with the following specification:
非像散, 单级光谱仪, 配置如下:

- 1.1.1 Extremely high efficiency spectrograph (>50% throughput in spectrograph).
系统总通光效率大于50%
- 1.1.2 kinematically mounted, magnetically attached, Rayleigh line rejection Rayleigh filter set for 405nm excitation.
用于滤除405nm瑞利线的瑞利滤光片 (Rayleigh filter), 采用三点机械定位方式, 磁性粘贴, 拆卸方便, 重复性好。
- 1.1.3 Visible lens set for optimised spectral resolution and through put.
可见聚焦透镜, 使光谱分辨率和通光效率最佳。
- 1.1.4 Encoder feedback controlled grating stage with one grating (2400 lines mm⁻¹) on kinematic mount.
采用光栅尺控制光栅转台, 2400线/毫米光栅, 三点机械定位连接方式
- 1.1.5 Spectrometer repeatability: $\leq \pm 0.02\text{cm}^{-1}$ / 光谱重复性 $\leq \pm 0.02\text{cm}^{-1}$
- 1.1.6 Unique rapid 'extended scanning' facility for measurement of high resolution spectra with wider wavelength range than can be accommodated on a single CCD view, without any 'stitching' of spectra together. Spectral resolution continuously variable via CCD binning control.
独特的快速连续扫描方式可获得任意宽波段光谱, 无需接谱, 不受CCD宽度的限制, 并保持高光谱分辨率。光谱分辨率可通过CCD的binning方式连续可变。
- 1.1.7 Standard CCD array detector (1024 x 256 pixels). Peltier cooled to -70 °C. No water or liquid nitrogen required.
标准CCD探测器(1024 x 256 像素)。半导体冷却至-70 °C, 无需水或液氮冷却。
- 1.1.8 Motorized filter wheel with neutral density filters offering 16 different power levels from 0.000005 to 100%.
计算机控制激光衰减片, 共16级, 从0.000005到100%

1.2 Kinematic system baseplate /三点机械定位底板

1.3 Microscope /显微镜

Specially adapted Research Grade Leica microscope allowing confocal measurements. Including:
采用研究级徕卡显微镜, 专门设计的谱仪与显微镜耦合器件, 可实现共焦显微测量包括:

- 1.3.1 Reflected light illumination /反射照明灯
- 1.3.2 Monocular head with a colour video camera /彩色摄像机
- 1.3.3 x5,x20, x100 and x50LWD objectives / x5,x20, x100 and x50LWD镜头

1.4 Laser kit/激光器

- 1.4.1 Renishaw Diode laser, 30 mW at 405nm, air cooled, for external mounting on a kinematic laser baseplate.
激光器405nm, 30毫瓦, 可连接三点机械定位激光器底板
- 1.4.2 Kinematic laser baseplate for 405nm diode laser.

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用于405nm激光器的三点机械定位底板

1.4.3 Plasma filter kit for 405nm /405nm等离子滤光片

1.4.4 Motorised laser beam steering for computer controlled laser alignment, /计算机控制的激光光路准直

1.5 Computer kit /计算机

1.5.1 Intel Computer /Intel主机:

- 双核2.6 GH以上速度
- 8G RAM
- 1TB hard disk
- Windows 10 operating system.

1.5.2 27" LCD Colour Monitor /27"液晶彩显

1.5.3 Viewing and saving white light images

可观察和存储显微镜下的白光像

1.6 Software/软件

1.6.1 Renishaw WiRE 5.0 instrument control and data acquisition software, fully integrated data analysis and presentation software with image capture software for white light image display and capture
雷尼绍WiRE 5.0仪器控制和数据采集软件，并提供完整的数据分析和图像处理软件。

2 Upgrade /升级配置:

2.1 Upgrade to inVia+Plus level, including:

主机配置升级至inVia+Plus，包括:

- 2.1.1 Laser beam expander to allow laser spot size continuously variable from 1 to 250 μm (objective and excitation wavelength dependent) with fully optimised beam path
计算机控制扩束器，使激光光斑可在1至250微米连续变化（和物镜与激发波长有关）
- 2.1.2 Motorised entrance slit /自动调节狭缝
- 2.1.3 Encoded rotary stage for automated Rayleigh filter changeover assembly /不同波长滤光片之间的自动转换
- 2.1.4 Transmitted light unit with Abbe condenser for Leica microscope /透射照明灯
- 2.1.5 Trinocular head with eyepieces and a colour video camera /同时具有目镜和彩色摄像机

2.2 Upgrade to inVia-Reflex to include automation and self validation, including:

升级至全自动控制的inVia Reflex（需同时选择2.1项），包括:

- 2.2.1 Auto align and optimisation of input laser power /自动准直入射激光光路
- 2.2.2 Auto switch and auto align of laser through beam expander unit /自动转换激光和自动准直
- 2.2.3 Self validation using built-in internal reference sample
内置标准样品，自动对仪器的工作状况进行诊断，以确认仪器工作正常
- 2.2.4 Built-in self calibration using atomic emission source /内置标准源，自动校准
- 2.2.5 Motorised switching between laser and white light sample images using integral video
自动转换激光光谱模式和在摄像机下观察白光像模式

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2.3 Upgrade to inVia Qontor to include LiveTrack™ laser real-time focus function

主机升级至激光实时聚焦LiveTrack™的inVia Qontor，包括：

- 2.3.1 No white light pre-scan method, precise real-time laser focus, including sample observation mode, single point Raman test mode and fast Raman scan mapping mode.
非采用白光预扫描模式，具备精确的激光实时聚焦功能，包括样品观察模式，单点拉曼测试模式及快速拉曼扫描成像模式。
- 2.3.2 Laser real-time dynamic focusing and Raman in-situ testing can be achieved for samples with dynamic change in height.
对于高度动态变化的样品，可实现激光实时动态聚焦及拉曼实时原位测试。
- 2.3.3 Different excitation wavelengths use Raman original laser for real-time range feedback, without chromatic aberration.
不同激发波长均采用测试拉曼的本源激光做实时测距反馈，无色差。
- 2.3.4 Ultra-fast automatic focusing is achieved in real time through the special laser beam splitting system in cooperation with the automatic stage. The response speed of automatic focusing is better than 100 us. The focusing system and the Raman test are independent of each other and run in parallel without the need of pre-positioning.
通过专用激光束分光系统，配合自动平台实时完成超快自动聚焦，自动聚焦响应速度好于100us，且自动聚焦系统与拉曼测试相互独立，平行运行，无需预先定位。
- 2.3.5 Chemical structure information of the sample is obtained by Raman test with the same time of the morphology information, so that the unevenness, and bending of the sample can be recorded in real time.
测试拉曼传递样品化学结构信息的同时得到样品的形貌信息，可实时记录样品的不平整、弯曲及粗糙程度。
- 2.3.6 The range of the real-time autofocus is only limited only by the travel of the automated sample stage, X≥100mm, Y≥70mm, Z≥20mm.
实时自动聚焦范围只受自动载物平台行程限制，X≥100 毫米，Y≥70毫米，Z≥20毫米。

3 Accessories /附件

3.1 Encoded, automated motorised XYZ mapping and sample stage :

- 3.1.1 Encoded high precision motorised XYZ mapping and sample stage /自动 xyz 三维平台
- 3.1.2 Renishaw Encoder feed back control to ensure high repeatability, /采用光栅尺反馈控制，确保高重复性。
- 3.1.3 Repeatability <= 0.01um,
- 3.1.4 Scan range X > 100mm, Y > 70mm
- 3.1.5 with joystick and software control, / 操纵杆和软件控制皆可控制；
- 3.1.6 allow scatter, line, and area mapping, and confocal depth profiling, /可进行分散的多点、线、面扫描和共焦深度的扫描；
- 3.1.7 Complete with Renishaw WiRE XYZ Stage and Mapping Control software and Renishaw WiRE FocusTrack software. /提供雷尼绍 WiRE 控制软件，可实现自动聚焦功能。

3.2 Libraries, including/数据库，包括

- Galactic Spectral ID Library Search / Galactic Spectral ID 谱库搜索软件

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- Renishaw Minerals database (used with Galactic Spectral ID Library Search) /雷尼绍无机数据库
- Renishaw Polymer database (used with Galactic IR Search) /雷尼绍有机高分子数据库

4 Upgrade of existing inVia system to incorporate Renishaw “StreamHR” rapid Raman imaging technology to include 升级大面积高速扫描拉曼成像，包括：

- 4.1 Full WiRE 5.0 software package for rapid data acquisition. With software for facilitate segmentation of spectral data together with data analysis and real time image creation during acquisition based on:
全套WiRE 5.0软件包。包含快速数据采集、处理等功能模块。内置控制及数据处理软件，可方便快速地处理数据，并基于以下指标实时进行数据分析和成像：
- 4.1.1 intensity at a point /某一个拉曼信号的强度
 - 4.1.2 integrated intensity /拉曼信号特定范围强度的综合信息
 - 4.1.3 component analysis using direct classical least squares /成分含量分布信息高分辨图象
- 4.2 Upgrade of current compatible xyz stage controller to new Renishaw stage controller with trackbal. /升级到大面积快速拉曼扫描成像专用三维自动平台
- 4.3 3D mapping /3D成像

注：以上为平面二维高速扫描拉曼成像，利用此附件可对大到厘米尺寸的样品进行快速拉曼扫描实时成像，并保持空间分辨率与传统逐点扫描相同。

5 Upgrade Renishaw’s new ultra-fast Centrus CCD detector / 升级Centrus超快CCD检测器

- 5.1 Centrus CCD replace standard CCD / Centrus CCD替换标准CCD
- 5.2 Pixel size 26X26um /像元尺寸26x26 μm
- 5.3 Maximum cooling -70°C /制冷温度-70°C
- 5.4 Read noise: as low as 4e-($<4e^-$ in EM mode) /最小读出噪音4电子/秒/像元
- 5.5 Minimum cycle time 1ms /最小曝光时间1ms
- 5.6 Peak quantum efficiency 92% Max /量子效率峰值92%
- 5.7 StreamHR Rapide model: collect data faster than 1000 spectra/s /超快速拉曼扫描成像，扫描速度好于1000张/秒

6 光学平台：1.8X1.2米