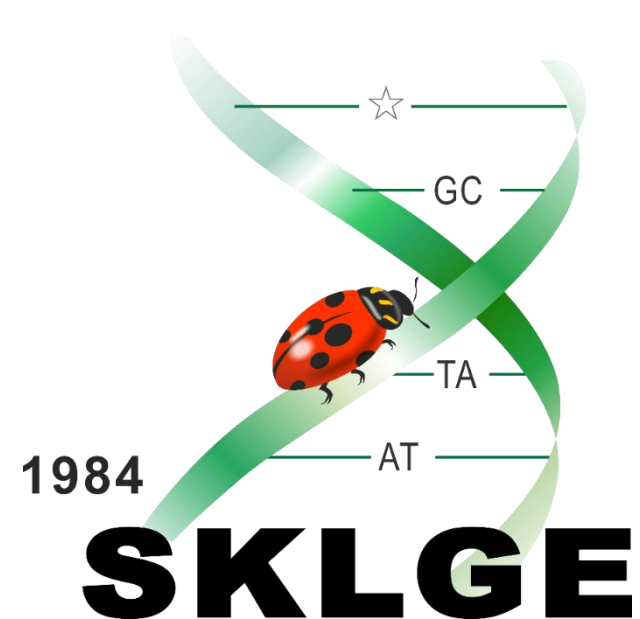




遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

光学显微镜平台简介

光学显微镜平台拥有众多先进的成像设备，包括超分辨成像系统、多光子显微镜、光片显微镜、高速转盘共聚焦成像平台、点扫描共聚焦显微镜、高内涵成像分析系统、宽场荧光显微镜、荧光体视镜、高通量植物成像系统、显微切割仪、独立显微图像分析处理工作站等等，为模式生物、组织、细胞、生物材料成像提供强大的资源。平台面对校内科研用户提供每周7天24小时显微成像服务，同时也接受来自校外学术单位或企业合作伙伴的样品。我们的服务包括技术支持、设备选择咨询、实验设计、仪器培训、设备故障排查、数据解读等等。通常，成像对象包括固定样品、培养细胞、组织切片、小动物、植物等等。

平台设备

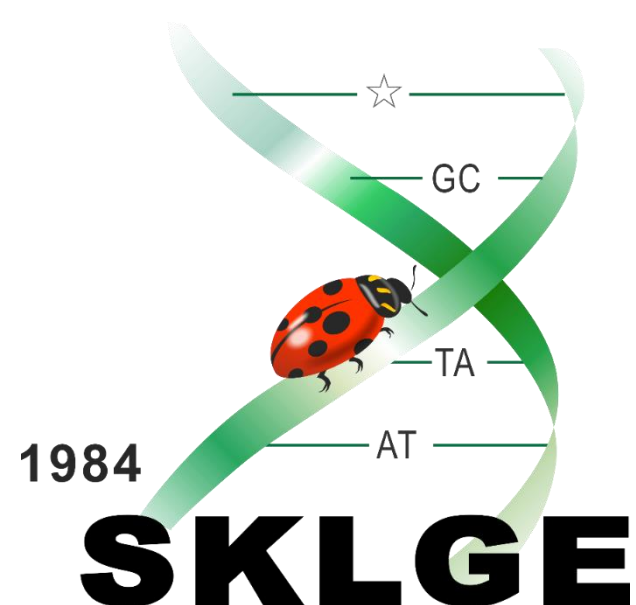


平台提供的成像技术

- ◆ 固定标本或活体的高分辨率成像；
- ◆ 长时间活细胞序列成像；
- ◆ 整张切片成像，并进行自动无缝式拼图；
- ◆ FRET、FRAP、FLIP、FLIM和胞内钙离子浓度检测等；
- ◆ 透射光成像（相差、微分干涉等）；
- ◆ 高通量筛选（共聚焦和宽场）；
- ◆ 厚样品的双光子成像；
- ◆ 超分辨SIM成像；
- ◆ 光切片成像和三维重建；
- ◆ 全内反射荧光成像；
- ◆ 组织显微切割和单细胞捕获。

平台技术人员与联系信息

联系人：杨建鸽、史丹、朱根凤 地址：生科楼E101-4室 电话：021-31246565



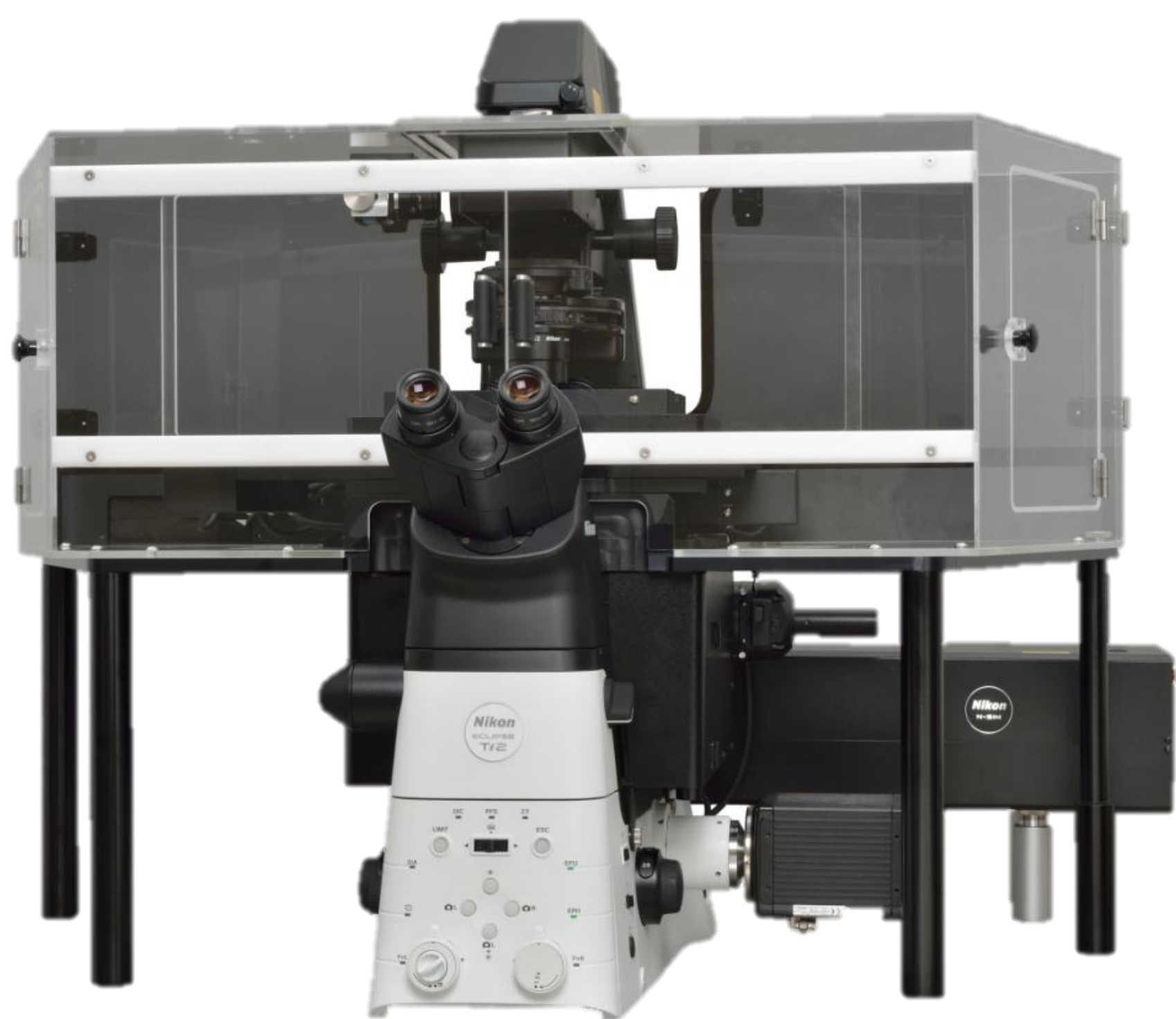
遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

N-SIM S超分辨显微成像系统

N-SIM S基于结构光照明原理，结合优越的高数值孔径物镜（1.49），将传统光学显微镜的空间分辨率提高了近一倍（XY: 115nm, Z: 269nm），同时借助新颖的高速照明调制技术，获得了高达15 fps的采集速度，从而有利于解析微细样品的动态变化过程。N-SIM S具有三种超分辨成像模式（TIRF-SIM/2D-SIM/3D-SIM），分别适用于表浅膜结构分析，“活”样品动态信息捕获以及厚样品高清晰度解析，且三种模式间可以无缝切换，简化工作流程。应用范围包括：细胞器间相互作用，细胞骨架蛋白分析，有丝分裂与减数分裂过程，神经元树突棘形态变化，细胞膜的内吞作用，荧光探针开发，自噬机制，酵母菌囊泡，病毒侵染路径，植物液泡研究，材料化学分析以及动态过程追踪等等。



仪器位置：E101-1

负责老师：韦有衡 史丹

联系电话：31246565

规格配置：

- 1、成像模式：明场、TIRF-SIM、2D-SIM、3D-SIM；
- 2、四激光：405nm、488nm、561nm、647nm；
- 3、Piezo载物台；
- 4、Hamamatsu flash 4.0 V3相机；
- 5、物镜：10X、40X、60x (water)、100x (Oil)；
- 6、兼容培养皿和切片；
- 7、NIS-Elements控制和数据分析软件。

功能应用：

- 1、超分辨图像获取、重建及处理；
- 2、手动、自动域值设定，生成二进制图像用于细胞计数、结构分割、区域统计；
- 3、共定位分析；
- 4、感兴趣区域亮度比较等。

仪器使用网上预约，仪器预约网址：<http://lifesupporting.fudan.edu.cn/>

全光谱多光子荧光寿命成像系统Leica TCS SP8 DIVE FALCON

徕卡全光谱多光子荧光寿命成像系统基于Leica TCS SP8共聚焦模块化成像平台，同时具有单光子、多光子及荧光寿命成像模块，功能强大，使用灵活。单光子部分，徕卡专利的HyD超高灵敏检测器配合徕卡独有的线性扫描及lightning技术，可实现<120nm的超高分辨率成像；同时拥有超快速共振扫描模块，在512*512分辨率下可达到28fps的图像采集速度。多光子部分，徕卡独家的全光谱外置检测器可实现超高灵敏度下全光谱（380–800nm）自由检测；1300nm红外脉冲激光器将可选染料拓展至红外区，可灵活实现双光子、三光子及谐波振荡等成像方式。FALCON快速荧光寿命成像模块以300MCPS光子计数速率，能够轻松获取固定及快速动态过程中的荧光寿命信息，为科学研究提供了新的维度。



仪器位置：E101-3

负责老师：朱根凤

联系电话：31246643

规格配置：

- 1、2个高灵敏的外置全光谱多光子检测器（HyD–RLD），检测范围380–800nm，最小步进1nm；2个内置全光谱检测器，最小步进1nm
- 2、双光子激光器：可调680–1300nm红外谱线，固定谱线1045nm；6条单光子激光器：405/458/488/514/561/633nm
- 3、快速荧光寿命成像：300MCPS光子计数速率，荧光寿命成像速度提升10倍
- 4、超高分辨率Lightning侧向分辨率<120nm
- 5、快速共振扫描28fps@512X512
- 6、物镜：10x，20x，40x，40x（水），63x（水）

功能应用：

- 1、全光谱共聚焦成像，覆盖常用波长
- 2、多光子多色荧光成像：适合组织/活体动物深度成像，穿透深度达1mm
- 3、二次/三次谐波震荡成像：无需标记，实时在线成像胶原、肌肉、髓鞘、血流等
- 4、荧光寿命成像（FLIM）：检测自发荧光的荧光寿命，检测细胞组织的代谢状态如NADH/FAD；检测活细胞动态荧光寿命（如钙成像）
- 5、超高分辨率成像（Lightning），分析共定位或解析亚细胞结构
- 6、高速动态成像与观察
- 7、FRAP、准确的FLIM–FRET测量、共定位分析、灵活的拼图模块Navigator
- 8、有孵育箱，可实现活细胞长时间成像

仪器使用网上预约，仪器预约网址：<http://lifesupporting.fudan.edu.cn/>

超分辨共聚焦显微镜Zeiss LSM880-Airyscan

独有的Airyscan超分辨检测器，同时拥有快速的超高分辨率成像，以及高灵敏度的图像采集，在高分辨模式下可获得横向120nm分辨率，轴向350nm分辨率，并能将信噪比提升4-8倍。LSM880通过线性扫描的均匀照明方式，结合高灵敏度的检测器，能够对样品进行低损伤成像。扫描中可以连续监测和校正扫描器的位置，确保稳定的观察视野以及在整个观察视野内保持每个像素相同的驻留时间。在512*512的分辨率下以高达13fps的速度采集图像。



仪器位置：E101-13

负责老师：史丹

联系电话：31246565

规格配置：

1. 倒置显微镜，使用0.17mm盖玻片或者底部为玻璃底的，并且厚度为0.17mm的培养皿
2. 配有405，488，561，633四根激光管，可激发出405，454，488，514，561，633六条发射光谱
3. 物镜：5x，10x，20x，40x，40x（水镜），63x（油镜），63 x（甘油镜）

功能应用：

1. 荧光信号的定位
2. 形态拍摄
3. 图像的三维构建
4. 时间序列拍摄
5. 具有光谱拆分功能
6. FRAP，荧光漂白实验
7. FRET能量共振转移
8. 钙波的拍摄
9. 金属离子相对浓度和绝对浓度的测定，比如钙离子，铜离子等
10. 大视野图像拼接拍摄
11. 高分辨率拍摄。高分辨模式下可获得横向120nm分辨率，轴向350nm分辨率

仪器使用网上预约，仪器预约网址：<http://lifesupporting.fudan.edu.cn/>

高速转盘共聚焦成像平台Andor Dragonfly

转盘共聚焦Dragonfly是将激光扩束成面照明，通过微透镜转盘聚焦到共聚焦针孔，扫描过程中转盘以高速的旋转方式多点与sCMOS探测器采集同步得到共聚焦图像，其速度在512*512的分辨率下可达190fps。系统具有极低的光损伤和极高的成像速度、灵敏度，对活细胞或组织动态过程或极度光敏感过程的3维（x、y、z）、4维（x、y、z、时间）、5维（x、y、z、时间、多波长）、6维（x、y、z、时间、多波长、位置）实时记录和观察，能够长时间观察并记录动物活细胞、微生物或植物活体组织的生理变化过程（1-7days），或者进行动物活细胞、微生物或植物活体组织高速短时间成像。同时可满足固定荧光大样品（如脑片、类器官、斑马鱼等）的快速高分辨大视野成像，比常规共聚焦成像速度提高20x以上。



仪器位置：E101-12

负责老师：杨建鸽

联系电话：31246565

规格配置：

1. 倒置显微镜，使用0.17mm盖玻片或者底部为玻璃底的，并且厚度为0.17mm的培养皿
2. 配有405，488，561，637四根激光管
3. 物镜：4x、10x、20x、40x（油镜）、60x（油镜）、100x（油镜）、150x（油镜）
4. 显微镜CO2培养室
5. 光刺激模块

功能应用：

1. 荧光信号的定位
2. 形态拍摄
3. 图像的三维构建
4. 时间序列拍摄
5. 4D活细胞动态成像
6. 厚组织成像
7. FRAP、荧光漂白实验
8. FRET能量共振转移实验
9. 钙波的拍摄
10. 大视野图像拼接拍摄

超分辨率转盘共聚焦系统 Olympus/Evident SpinSR

Olympus/Evident超分辨率转盘共聚焦系统，采用了不同于传统点扫描共聚焦的扫描单元结构，实现了快速、多维、超高分辨率成像相结合，具有较低的光毒性和光漂白特性，可以保持培养细胞的长时间活性状态。可以满足常规组织切片共聚焦扫描成像及大图拼接成像，深层厚组织三维高分辨及超高分辨率成像，双相机同步成像，可以满足快速动态荧光信号比例分析成像，配合第四代硬件自动对焦系统，可以实现胞内细胞器如细胞骨架、细胞核结构、自噬体膜结构等亚细胞结构的长时程实时观察成像，类器官多荧光通道三维结构高速高分辨率成像，结合特有的TruSight反卷积模块，可以实现多种样本<120nm是超高分辨率成像。



仪器位置：E101-13

负责老师：杨建鸽

联系电话：31246643

规格配置：

1. 5激光：405/488/561/594/640nm
2. 2个高灵敏sCMOS相机，量子效率95%，读出噪声0.6e，全幅帧率89fps，全幅2304x2304像素
3. 硬件超分辨率技术，实时分辨率可以达到<120nm分辨率
4. 第四代硬件防漂移系统
5. 活细胞培养装置
6. 压电陶瓷Z轴，实现快速三维成像
7. FRET实时分析模块
8. 物镜：10x, 20x, 40x高分辨率空气镜，20x长工作距离高分辨率物镜，60x高分辨率油镜，150x超高分辨率油镜

功能应用：

1. 常规多通道共聚焦荧光成像
2. 常规荧光组织切片扫描，及大组织拼图成像
3. 多通道活细胞长时程多维成像
4. 类器官或厚组织三维快速成像
5. 活细胞结构与分子超高分辨率成像
6. FRET荧光比例分析
7. 细胞内分子高速动态变化成像

仪器使用网上预约，仪器预约网址：<http://lifesupporting.fudan.edu.cn/>

UltraMicroscope II 光片成像系统

UltraMicroscope II 系列光片显微镜可以对大体积生物样本进行更加快速、高分辨率的三维扫描成像，比如啮齿类动物器官、胚胎等。UltraMicroscope II 光片显微镜采用对偶正交光通路，能够将光照限制在一个平面上，让研究者更加快速地深入了解大体积样本的生物结构，为从整体上研究生物系统和生理过程提供了全新的工具。UltraMicroscope II光片显微镜的光片参数灵活可调，检测不同样本时，可以通过软件轻松地选择不同的参数设置，以达到最佳成像效果。在对小样本成像时，通常选择高孔径（High NA）照明，以得到更好的 Z 轴分辨率。而对大体积样本进行大视野观察时，则选择低孔径（Low NA）照明。UltraMicroscope II采用双向三束光片从不同角度均一地激发样本，保证成像暗区和投影带最小化。仪器可以兼容现有的各类透明化方法，进行自动调整和补偿，获得最佳成像效果。



仪器位置：E101-12

负责老师：史丹

联系电话：31246565

规格配置：

- 1、白光激光器，波长范围 405-850 nm。
- 2、双侧 6 束光片，光片厚度 4 μm - 24 μm ，宽度 1 mm - 20 mm
- 3、可使用成像液折射率范围 1.33 - 1.56
- 4、样本尺寸最大 X*Y*Z 为 1 cm*1 cm*1 cm
- 5、物镜 1X、4X、12X MI Plan

功能应用：

- 1、各类组织器官的完整三维荧光成像
- 2、模型动物中药物靶点的筛查和验证
- 3、组织中各种细胞类型的鉴定和空间分布成像
- 4、神经元的分布和走向三维成像
- 5、血管分布的三维荧光成像

高内涵细胞成像和分析系统Operetta CLS

高内涵成像分析系统能够在保持细胞结构和功能完整性的前提下，对细胞和亚细胞层次进行多通道、多靶点的荧光或可见光的全面扫描，检测细胞形态、生长、分化、迁移、凋亡、代谢途径及信号转导等各个环节，在单一实验中获取大量相关信息，并利用优良的图像数据管理软件对巨量的数据进行有效的管理和分析，给出细胞形态、荧光强度、信号分布的数据，还可以动态分析细胞迁移、增殖等。结合最新的3D培养等技术，可以更准确检测药物活性，把药理、毒理和细胞水平的功能性研究提高到一个全新的水平。



仪器位置：E101-12

负责老师：史丹

联系电话：31246565

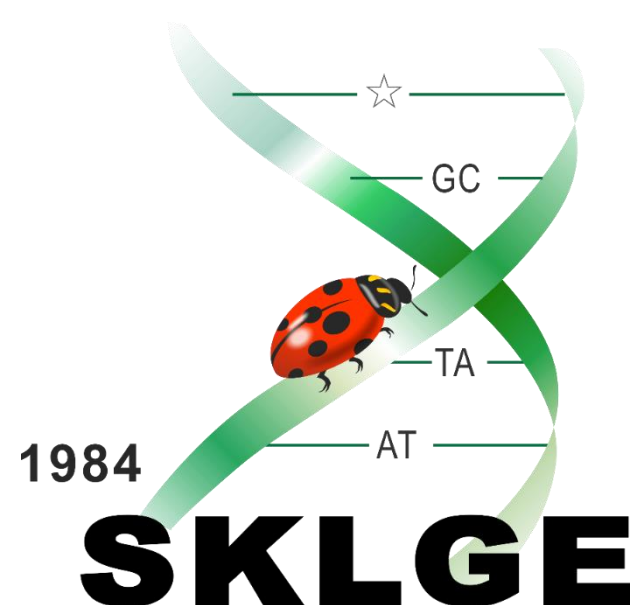
规格配置：

1. 专业一体化高内涵设计光路系统，转盘共聚焦扫描单元；
2. 8波段固态长寿命LED，激发波长：365nm、405nm、440nm、475nm、510nm、550nm、630nm、660nm
3. 近红外740nm单色LED明场光源；
4. 物镜：5x、10x、20x、40x；
5. 活细胞培养装置；
6. 载物台适配器适合所有标准的6-1536微孔板，并配有载玻片适配器，可进行组织切片成像；
7. 高性能图像工作站；Harmony采集和分析软件预设32种应用分析解决方案，含细胞计数或核计数、活/死细胞计数、核内标志物定量、细胞质标志物定量、质膜标志物定量、胞质向核迁移、胞质向膜迁移、荧光重分配—细胞骨架、Spot分析、核内Spots等等；

功能应用：

本系统检测应用范围包括：靶点激活、细胞凋亡、分裂指数、蛋白转位、细胞活力、细胞迁移、受体内化、细胞毒性、细胞周期和信号转导等。可对细胞样本进行处理，建立筛选反应体系。

仪器使用网上预约，仪器预约网址：<http://lifesupporting.fudan.edu.cn/>



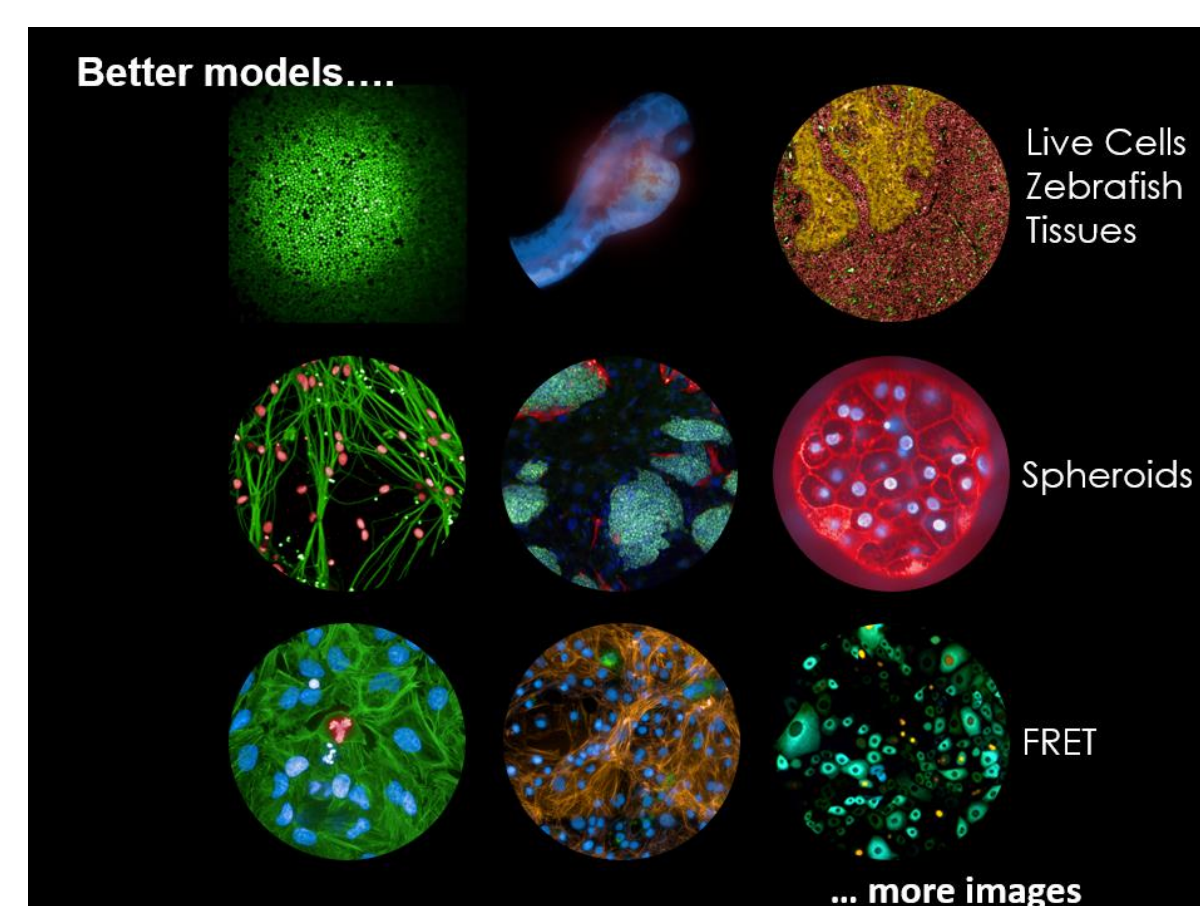
遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

PerkinElmer/Opera Phenix转盘共聚焦高内涵成像和分析系统

Opera Phenix是一个细胞成像驱动的高内涵细胞成像与分析平台和药物筛选平台。具备明场及激光转盘共聚焦两种成像方式，远红外自动对焦，激光光源和双转盘共聚焦技术高信噪比成像，水浸物镜高灵敏度和高分辨率成像，39种预设应用分析算法，自学习算法，智能细胞表型参数推荐功能，多模式细胞纹理分析。可以广泛应用于亚细胞分辨率水平上的细胞筛选应用，包括常规的微孔板到组织切片的范围等。针对不同细胞模型采用荧光强度区域分析，细胞形态学分析，细胞内部纹理（细胞骨架，细胞器线粒体分布等），明场细胞照片的无标记分析等多种不同分析手段，综合的对细胞的状态、变化、总体趋势进行分析，得到具有高内涵高可靠性的分析结果，立体的对细胞各个方面不同侧面进行阐述。在细胞凋亡、细胞周期、细胞毒作用、受体蛋白转位、蛋白相互作用等许多方面都有很好的应用。



仪器位置：G108

负责老师：李晋

联系电话：31246592

规格配置：

1. 兼容多种SBS标准微孔板（6，24，48，96，384，1536）以及用户自定义的非标准微孔板和载玻片
2. 16bit 440万像素科研级sCMOS
3. 具备DPC数字相差成像功能，可实现明场下的细胞定量
4. 标配4色固态激光光源：• 405 nm • 488 nm • 561 nm • 640 nm
5. 63X水镜成像模块

功能应用：

1. 高内涵和共聚焦成像
2. 活细胞成像
3. 复杂细胞模型，比如3D细胞球和类器官
4. 全自动细胞模型分析
5. 机器自学习功能
6. 高通量细胞成像和表型筛选
7. 基于高通量成像的药物筛选
8. 各种常规的细胞学成像的高通量自动化实现
9. 转盘共聚焦成像

仪器使用电话预约，预约电话：31246592

全光谱高分辨激光共聚焦成像系统 Leica STELLARIS 5

STELLARIS 5是一款快速全光谱高分辨激光共聚焦成像系统，其在分辨率、检测灵敏度及光谱自由度3个方面均具有突出的表现。激发端配备了405nm和448nm固体激光器和485-790nm连续可调脉冲激光器，调节步进为1nm，检测端配备了3个徕卡专利的Power HyD超高灵敏检测器，可做激发发射光谱扫描；并且额外配备了Lightning高分辨成像模块，可实现<120nm的超高分辨率成像；同时能够在实验中提供基于荧光寿命的信息（TauSense），去除反射光及杂散光，提高图像质量。



仪器位置：E101-2 负责老师：朱根凤 联系电话：31246643

规格配置：

- 1、脉冲白激光器：在485nm-790nm范围内，步进精度1nm，自由选择激发谱线，同时输出脉冲激光谱线8条；2根固体激光器：405/448 nm
- 2、棱镜分光系统，配备3个HyD S全光谱超高灵敏度探测器，最小步进1nm，检测荧光波长范围410-850nm
- 3、TauSense时间分辨检测系统
- 4、超高分辨率系统Lightning：XY方向≤120nm，Z方向≤200nm
- 5、扫描速度：10fps@512X512
- 6、物镜：10x，20x，40x（水），63x（油）

功能应用：

- 1、全光谱共聚焦成像，覆盖常用波长
- 2、用于细胞器的观察和测定；明场细胞/组织形态观察；进行细胞或组织结构的三维重构等
- 3、时间分辨检测系统（TauSense）：
TauContrast提供即时功能信息，如代谢状态、pH值和离子浓度；TauGating通过去除不需要的荧光信号来提高图像的质量；TauSeparation帮助在实验中扩大荧光信号的组合，超越光谱的选择；TauInteraction直观地检测和定量分子间相互作用（如蛋白质-蛋白质相互作用）
- 4、超高分辨率成像（Lightning），分析共定位或解析亚细胞结构
- 5、FRAP、FRET、灵活的拼图模块Navigator

激光扫描共聚焦显微镜Olympus FV3000

Olympus FV3000是具有高灵敏度，高分辨率和高拍摄速度的激光共聚焦显微镜。设备配置了405nm、445nm、488nm、514nm、561nm、594nm、640nm激光谱线波段，四个GaAsP高灵敏检测器。配有齐全的物镜，搭配电动物镜转盘，可以快速从1.25X物镜的低倍率观察切换到最大150X物镜的高倍率详细观察。Olympus优良的高数值孔径硅油浸入式物镜，可以在深层组织上以较高分辨率获得明亮的荧光图像。超分辨率成像（FV-OSR）能够以大约120nm的分辨率顺序或同步获取4个荧光信号，几乎达到常规共焦显微技术分辨率的2倍。



仪器位置：E101-12

负责老师：杨建鸽

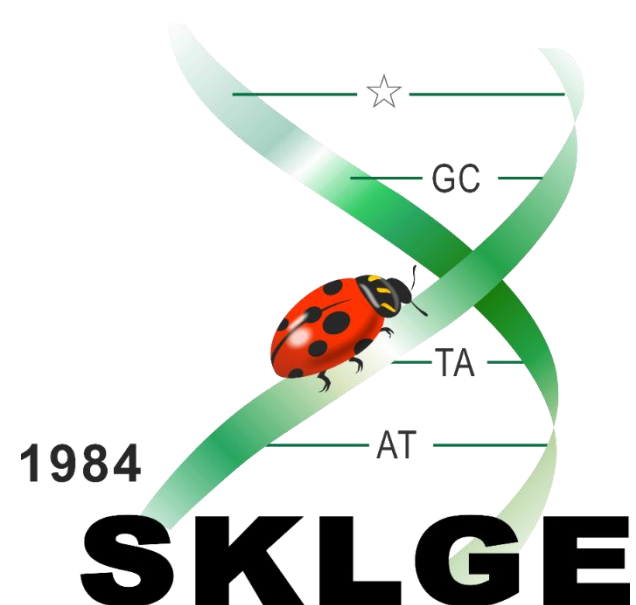
联系电话：31246565

规格配置：

- 1、系统使用倒置全电动显微镜；
- 2、配有七根全固体激光器，谱线包括405nm、445nm、488nm、514nm、561nm、594nm、640nm；
- 3、两种扫描单元，常规扫描可达16fps (512x512)，共振扫描可达30fps (512x512) 至438fps (512x32)；
- 4、配置四个GaAsP检测器和超高分辨率成像系统，可进行不少于4通道同时超高分辨率成像，分辨率120nm；
- 5、仪器配有10个高分辨率专用物镜，分别为
1.25倍、4倍、10倍复消色差物镜；20倍、40倍长工作距离高数值孔径物镜；30倍、60倍复消色差硅油物镜；60倍高分辨率共定位物镜；100倍高分辨率超高数值孔径复消色差物镜；150倍高分辨率复消色差物镜；
- 6、硬件红外防漂移系统；
- 7、3D deconvolution模块。

功能应用：

- 1、定性、定量、定时和定位荧光标记样品高空间分辨率成像及分布检测；
- 2、TrueSpectral全真光谱技术可执行高精度高线性光谱扫描、光谱检测和光谱拆分功能；
- 3、快速大视野无缝拼图；
- 4、3D结构重建；
- 5、FRAP、FRET实验；
- 6、离子与PH测量及其它应用。



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

组织病理学图像专用分析显微镜系统 Leica THUNDER Imager 3D Tissue

THUNDER Imager 是徕卡全新的宽场高清成像解决方案，旨在为生命科学研究提供瞬时、易用的高清解析成像，让科学工作同时具备宽场成像速度、低光毒性的优点和接近共聚焦显微镜的成像质量，让您无需再在多种成像性能上妥协！采用徕卡显微系统最新开发的智能光学数字技术computational clearing，同时优化显微镜软、硬件的图像采集，包括极高光量子效率相机、精准物台、新型光源、数据处理模块和功能强大的LAS X 软件等，在不牺牲景深和成像速度的前提下，采集有效光学信号同时去除干扰信号，实现高速、高清、高分辨率成像！仪器操作简便，仅需一键单击，即可高效去除组织切片（尤其是厚切片）成像中的非焦平面模糊信号，获得超精细的结构、优异的信噪比和极好的轴向分辨率，有效简化组织/病理切片、组织芯片、细胞爬片等实验操作流程，获得高质量、易分析、可重复的显微图像。



仪器位置：G108

负责老师：赵冰

联系电话：31246582

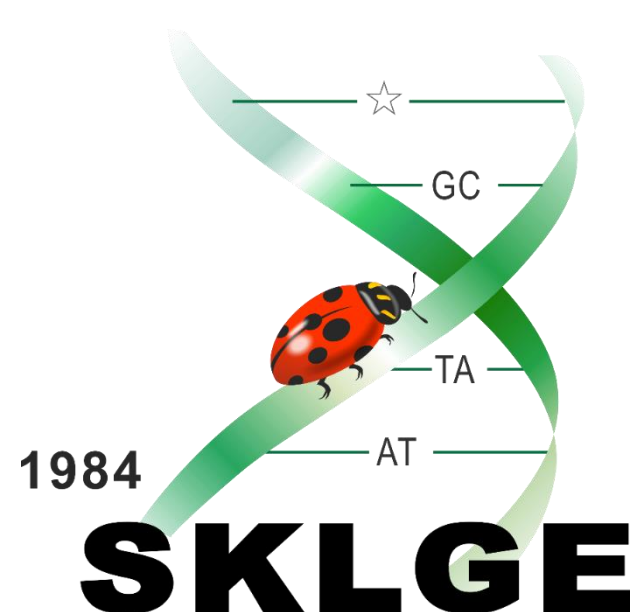
规格配置：

- 1、全自动正置显微镜+THUNDER工作站
- 2、双相机：420万单色sCMOS相机DFC9000GT & 2000万彩色CMOS相机DMC5400
- 3、4个荧光通道：DAPI、GFP、RHOD、Cy5
- 4、荧光光源：Leica LED3
- 5、载物台：8玻片电动扫描台
- 6、物镜：5x，10x，20x，40x，100x（油）

优势及应用：

- 1、嵌入人工智能，即时获得多色高清图像
- 2、专利荧光强度(FIM) 和对比度管理器，优化参数，减小光漂白
- 3、保护薄切片样品，出色的厚样品3D成像
- 4、LAS X Navigator 大尺度预览和无缝拼接
- 5、一键全自动成像，使用简单，日常无需校准
- 6、支持8玻片自动扫描

仪器使用电话预约，预约电话：31246582



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

正置激光扫描共聚焦显微镜Nikon A1

Nikon高级A1激光扫描共聚焦显微镜使用突破性技术，高速捕捉高品质细胞和分子水平图像。采用四通道检测器为标准检测器，可轻松进行四色标记样本成像；检流计式扫描器可获得达4096X4096像素的高分辨率图像；使用多种创新技术，如业界首度使用低入射角二向色镜，荧光效率提高30%；业界首度使用连续可变六边形针孔，提高亮度并保证共焦性；首创双集成信号处理技术改善电子效率，确保极高信噪比的获取。



仪器位置：E101-12

负责老师：杨建鸽

联系电话：31246565

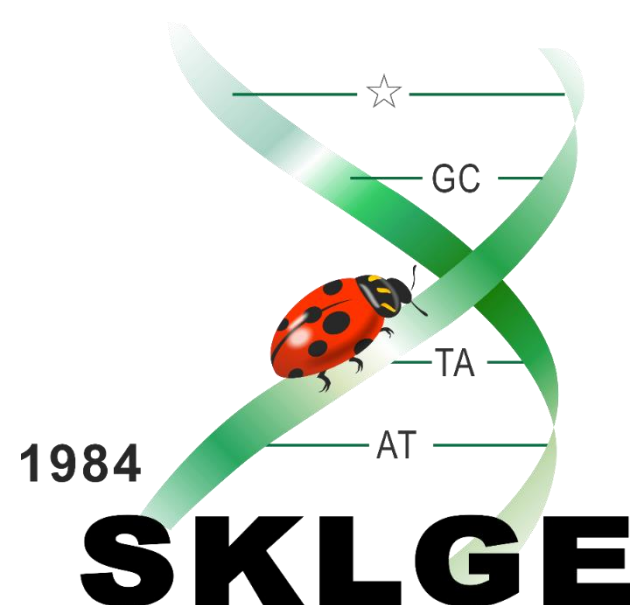
规格配置：

- 1、全电动正置荧光显微镜主机
- 2、配置全固态激光光源，包含405nm、488nm、561nm、640nm激光器，可检测的荧光光谱覆盖范围为400-750nm。
- 3、配置共聚焦专用物镜，含
10倍平场复消色差物镜：N.A. 0.45，W.D. 4.0mm；
20倍平场复消色差物镜：N.A. 0.75，W.D. 1.0mm；
40倍平场复消色差物镜：N.A. 0.95，W.D. 0.21mm；
40倍长工作距离复消色差水镜：N.A. 1.15，W.D. 0.6mm；
60倍平场复消色差物镜：N.A. 1.4，W.D. 0.14mm，油镜。

功能应用：

- 1、高分辨率多色图像及多维（X、Y、Z、时间、波长、多点等）图像采集；
- 2、大样品图像采集、拼接；
- 3、3D重构；
- 4、FRET；
- 5、荧光共定位分析；
- 6、其它多种测量、分析、统计处理功能。

仪器使用网上预约，仪器预约网址：<http://lifesupporting.fudan.edu.cn/>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

共聚焦显微镜Leica TCS SP8

Leica TCS SP8共聚焦成像系统拥有徕卡专利的HyD超高灵敏检测器可实现高灵敏低噪音的高分辨成像，棱镜分光光谱检测可提供最大灵活性的多色图像采集，超快速共振扫描模块在512*512分辨率下可达到28fps的图像采集速度。该系统可以非常好的去除非焦面的干扰信号，得到信噪比更好的图像，实现对厚样品的快速三维成像。另外，对于多色尤其是弱信号的图像采集和活细胞活组织的快速动态过程的观察也非常有优势。



仪器位置：C415

负责老师：朱根凤

联系电话：31246643

规格配置：

- 1、倒置显微镜；
- 2、405，Argon，561，633四条激光管，可激发405、458、488、514、561、633六条发射谱线；
- 3、10X、20X空气镜头、40X、100X油镜以及63X水镜；
- 4、配置超高灵敏检测器

功能应用：

1. 观察拍摄细胞和组织中单/多色荧光信号的分布和定位；
- 2、大样品多视野的拍摄拼接；
- 3、可进行FRET、FRAP、live data mode等相关实验；
- 4、全自动DIC，可实现荧光图像和DIC图像的叠加；
- 5、配有共振扫描系统，可实现高速图像采集。

仪器使用网上预约，仪器预约网址：<http://lifesupporting.fudan.edu.cn/>

高感度激光扫描共聚焦显微镜 Zeiss LSM710

Zeiss LSM710可以提供更深、更灵敏的图像采集和光学校正，在提高有效信号的基础上，大大降低了噪音信号，使得高质量的荧光图像成为可能。主要应用于对组织及细胞形态的研究，确定细胞生物学样品中荧光标记物的亚细胞定位，分析多种标记物的共定位以及空间分布情况，初步判断它们之间的相互关系和作用。



仪器位置：E101-13

负责老师：史丹

联系电话：31246565

规格配置：

1. 倒置显微镜，使用0.17mm盖玻片或者底部为玻璃底的，并且厚度为0.17mm的培养皿
2. 配有405，488，561，633四根激光管，可激发出405，454，488，514，561，633六条发射光谱
3. 物镜：10x，20x，25x（水镜），40x，63x（油镜）

功能应用：

1. 荧光信号的定位
2. 形态拍摄
3. 图像的三维构建
4. 时间序列拍摄
5. 具有光谱拆分功能
6. FRAP，荧光漂白实验
7. FRET，能量共振转移
8. 钙波的拍摄
9. 金属离子相对浓度和绝对浓度的测定，例如钙离子，铜离子等

ArcturusXT™激光捕获显微切割系统

Applied Biosystems® ArcturusXT™激光捕获显微切割系统是将激光捕获显微切割 (LCM) 和紫外(UV)激光切割融为一体的显微切割仪器。温和的红外激光器可理想地捕捉单细胞和小量细胞，紫外激光实现了前所未有的速度和精确度，非常适合高密度组织结构的切割和大量细胞的捕获。ArcturusXT™系统在显微切割的同时保有了样品的完整性以便于下游研究分析。开放、模块化的设计实现了前所未有的研究灵活性和多功能性。



仪器位置：E101-12

负责老师：杨建鸽

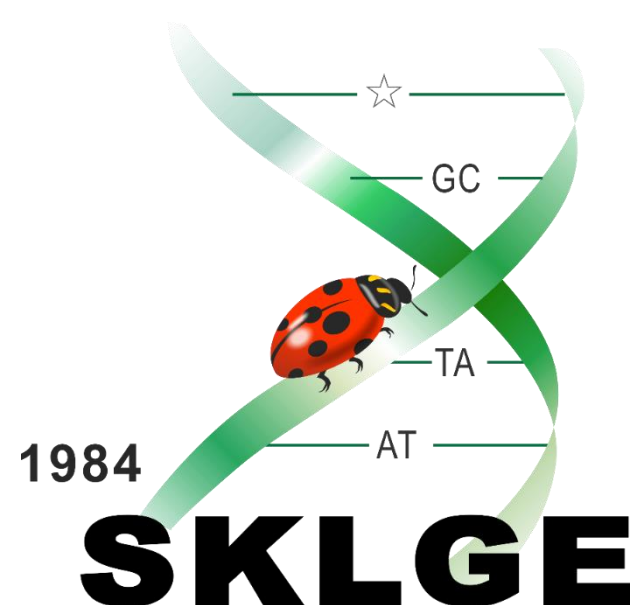
联系电话：31246565

规格配置：

- 1、显微镜：系统基于Nikon Eclipse® Ti-E倒置显微镜构建
- 2、红外捕获激光：固态，近红外810 nm；
- 3、紫外切割激光：固态，passive Q-switched, diode-pumped (355 nm)

应用：

- 1、基于PCR的DNA分析
- 2、RNA分析
如RT-PCR，线性扩增
- 3、蛋白分析
如二维电泳，WesternBlot，质谱等



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

OLYMPUS 倒置荧光显微镜 IX71

Olympus IX71倒置荧光显微镜可精确控制位置和光的重复性，是专为提高工作效率和显微成像可靠性而设计的显微镜，也是常规实验、记录以及其它科研任务的理想选择。



仪器位置：E101-12

负责老师：史丹

联系电话：31246565

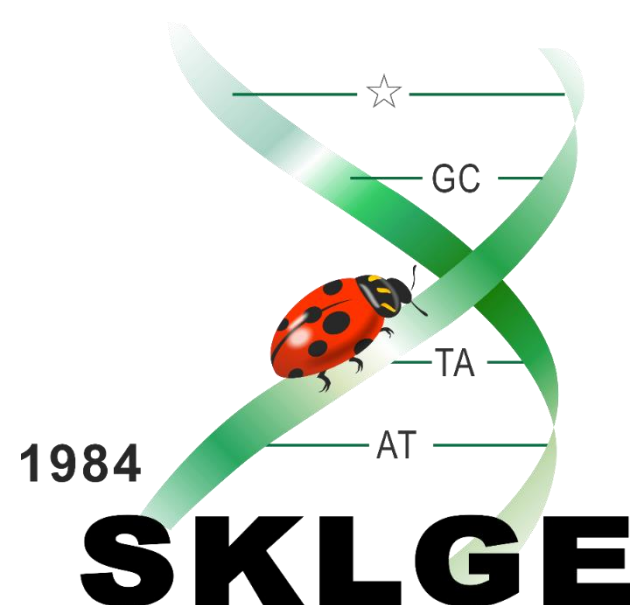
规格配置：

1. 倒置荧光显微镜
2. 配置4X，10X，20X，40X物镜
3. 配置DAPI，GFP，RFP荧光滤片
4. DP70彩色CCD相机
5. 奥林巴斯DP controller图像采集及处理软件

功能应用：

1. 适用于玻片，塑料培养皿，玻璃培养皿，多孔板中细胞的观察
2. 可进行BF，Ph以及荧光的观察

仪器使用网上预约，仪器预约网址：<http://lifesupporting.fudan.edu.cn/>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

OLYMPUS倒置荧光显微镜 IX73

Olympus IX73光学平台的设计可满足各种研究需求。Olympus UIS2光学元件使得在各种观察方法下都能得到高分辨率、高信噪比的图片。特有的涂层处理滤色片可以吸收99%以上的杂散光，最大程度地降低噪声。荧光激发镜组的优异性能和高透光率保证了对荧光信号的高效检测。IX73还有多种功能扩展元件，完美适用于不同研究环境。



仪器位置：E101-12

负责老师：史丹

联系电话：31246565

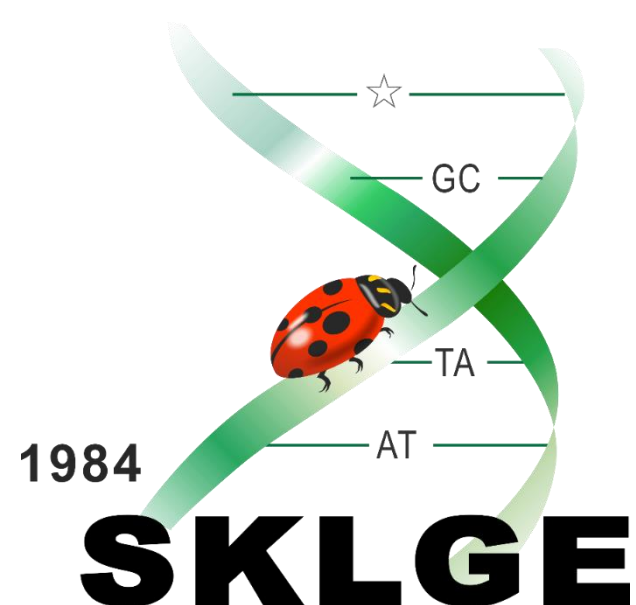
规格配置：

1. 倒置荧光显微镜
2. 配置4X，10X，20X，40X，60X物镜
3. 配置DAPI，GFP，RFP，CY5荧光滤片
4. DP80彩色/黑白双芯片CCD相机
5. 奥林巴斯cellsens standard图像采集及处理软件

功能应用：

1. 适用于玻片，塑料培养皿，玻璃培养皿，多孔板中细胞的观察
2. 可进行BF，Ph，DIC以及荧光的观察
3. 时间序列
4. 图像拼接
5. 景深扩展

仪器使用网上预约，仪器预约网址：<http://lifesupporting.fudan.edu.cn/>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

宏观变倍体视显微镜 Zeiss Axio Zoom V16

具有 16x 变倍范围与高数值孔径 ($NA=0.25$)，在同等系列立体变倍显微镜中遥遥领先。其在中等变倍范围内具有极高的数值孔径，能够在在大视场中获得超高亮度，适用于观察大尺寸样品，也可以在荧光模式下观察完整的模式生物体。



仪器位置：E101-12

负责老师：史丹

联系电话：31246565

规格配置：

1. 配置0.5x和1.5x物镜
2. 底部照明和环形照明两种明场光源
3. 配置GFP，RFP两种荧光滤片
4. 全自动主机架

功能应用：

1. 可进行小型样品透射光及荧光拍摄，适用于斑马鱼、线虫、果蝇等样品
2. 系统为全电动主机架，可进行多层扫描，景深扩展并合成清晰照片
3. 可进行时间序列拍摄，配置有自动荧光快门，长时间拍摄，较少荧光漂白

仪器使用网上预约，仪器预约网址：<http://lifesupporting.fudan.edu.cn/>

Nikon正置荧光显微镜Eclipse Ni-U

ECLIPSE Ni-U正置荧光显微镜具有极佳的基础性能、明亮清晰的光学系统、灵活的结构、长工作距离和高NA值物镜、极高的易用性，可广泛应用于各种临床检查和生物学研究。



仪器位置：E101-1

负责老师：史丹

联系电话：31246565

规格配置：

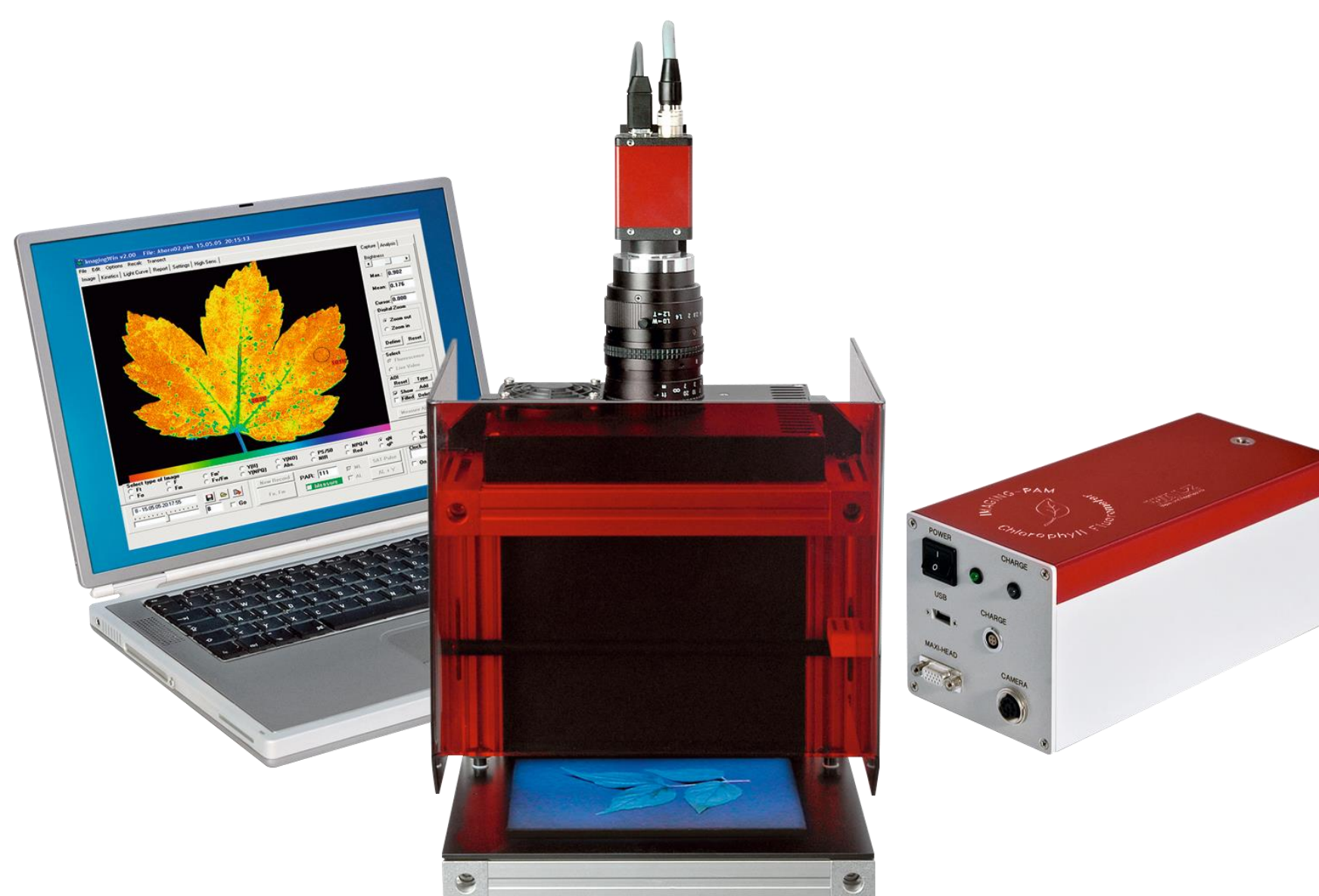
1. 正置荧光显微镜
2. 配置4X，10X，20X，40X，100X（油镜）物镜
3. 配置DAPI，GFP，RFP，CFP荧光滤片

功能应用：

1. 适用于固定样品的观察
2. 可进行普通明场，Ph，DIC以及荧光的观察

调制叶绿素荧光成像系统MAXI-IMAGING-PAM

调制叶绿素荧光成像系统是脉冲振幅调制(PAM)叶绿素荧光技术和CCD成像技术相结合的多功能植物光合生理测量系统。活体植物样品无需任何前处理，直接进行成像便可对光合作用能量转换与利用相关的Ft、Fo、Fm、Fv/Fm、F、Fm'、Y(II)、Y(NO)、Y(NPQ)、NPQ、qN、qP、qL、PS/50、Abs.、NIR、Red、Inh等至少18种参数进行成像分析。可设置程序测量荧光诱导曲线进行淬灭分析、测量快速光曲线和暗弛豫，也可手动测量，在测量过程中自动分析所有荧光参数的动态变化趋势。可以分析叶片的横向异质性，可用于抗逆，抗病植株的筛选。



仪器位置：C412

负责老师：朱根凤

联系电话：31246643

技术参数：

1. 相机及镜头：2/3" 相机CCD，1392×1040像素，采集速率30帧/秒，千兆以太网（GigE）通讯。
2. 光源：44个450 nm蓝色LED，频率1-8Hz可调，强度1-20级可调，光化光强度1-20级可调，最大强度1900 $\mu\text{mol m}^{-2} \text{s}^{-1}$ PAR，饱和脉冲强度1-10级可调，持续时间240-840ms可调，最大强度4000 $\mu\text{mol m}^{-2} \text{s}^{-1}$ PAR。
3. 成像面积：工作距离18.5cm时9cm×12 cm；工作距离22.5cm时11cm×15 cm

功能应用：

1. 光合光能转换效率测量
2. 淬灭分析
3. 损伤胁迫早期检测
4. 叶片吸光系数测量
5. 突变体筛选
6. 叶片横向异质性测量
7. 藻类毒理研究

植物活体成像仪Berthold NightSHADE LB985

Berthold NightSHADE LB985是专门用于植物活体研究，模块化且易用的光学成像系统。它的核心部件是一个超灵敏的冷CCD相机。相机可以安装在设备顶部或在侧面，可以在完全避光的暗箱内从顶部或侧面捕捉整体植物的光学信号。暗箱可进行温度或湿度控制。精确的分光系统可以满足多种荧光、发光基团的检测，以了解活体内细胞动态变化及基因表达情况。



仪器位置：C412

负责老师：朱根凤

联系电话：31246643

主要技术参数：

1. 相机 像素：1024×1024 、光学分辨率：<130 μm 、光谱范围：300-1050nm。
2. 暗室 完全避光、样本最大高度：250mm、4个LED灯。
3. X/Y筛选台 最大移动尺度：280 x210mm 、高度95mm。
4. 荧光单元 75W高能卤素灯、荧光激发波长340-1050nm 、内置4根光纤传导，保证激发光的均一性。
5. 箱体内配置植物生长日光模拟系统 双LED面板，LED灯波长：白光、470 nm、660 nm、730 nm。

功能应用：

1. 植物光周期相关研究
2. 植物抗逆性研究
3. 植物病菌侵害
4. 植物生长的连续观察
5. 基因育种筛选
6. 植物活体基因表达和克隆筛选

仪器使用网上预约，仪器预约网址：<http://lifesupporting.fudan.edu.cn/>

DynaPlant®植物幼苗高通量动态成像分析系统

DynaPlant®是对植物幼苗进行高通量动态成像分析的仪器平台，能够对幼苗进行分钟尺度的动力学分析。极高的拍摄通量使得该系统可适用于突变体库、生态型库的大规模筛选及表型组的建立。设备主要特点包括：(1)高通量，5min 标准周期最多可追踪拍摄300 棵幼苗的动态变化；(2)高精度：1.2 μm /像素；(3)多种实验条件自由组合：通过程序设定，实现一种或多种实验条件的自动改变与自由组合；(4)自动批量分析：提供GPU加速的图像处理程序，对获得的海量图像数据进行自动批量分析。



仪器位置：G110

负责老师：朱根凤

联系电话：31246643

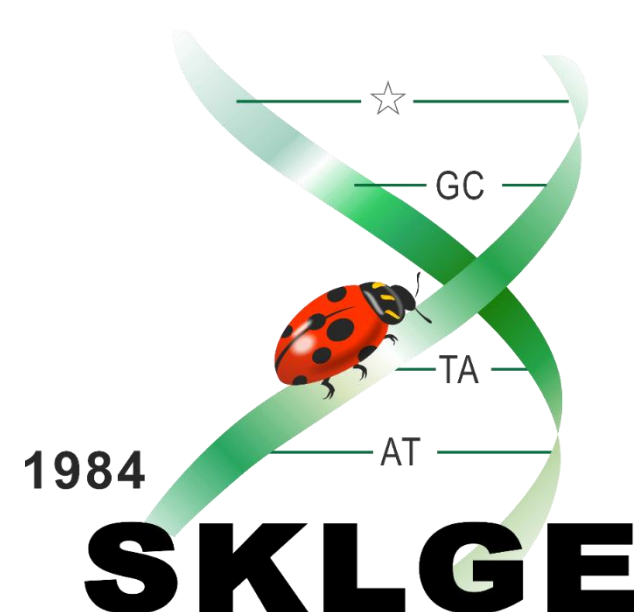
技术参数：

1. 八向旋转支架系统：16个培养皿。
2. 成像分辨率：3600万像素，1.2 μm /像素
3. 高精度三维移动平台：1 μm
4. 环境控制系统：光源系统（混合白光/450nm/660nm/730nm）、气体控制（二氧化碳400-5000ppm、乙烯0-10ppm）、温度控制（12-35℃）、重力控制

功能应用：

1. 茎（下胚轴）：长度，生长速率，弯曲角度及其变化率
2. 子叶顶端弯钩：弯曲角度及其变化率
3. 根：长度，生长速率，弯曲角度及其变化率
4. 种子：萌发时刻，累积萌发率
5. 根毛：位置分布，出现时间，生长速率
6. Luciferase活性实时定量

仪器使用网上预约，仪器预约网址：<http://lifesupporting.fudan.edu.cn/>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

植物成苗高通量动态成像分析系统 Phenotyping Gantry Entoscan

Phenotyping Gantry Entoscan 采用多槽式水耕系统与多色光谱光照模拟，搭载多光谱摄像头以及叶绿素荧光摄像头，可配合不同营养液，用于不同对照组之间的表型研究、成长趋势研究、病理学研究、虫害研究、植物健康情况评估、逆境研究（耐涝、抗旱、耐盐、高温胁迫、低温胁迫），可结合精准环控条件：温度、湿度、CO₂浓度、各种纬度光照，得到图像资料后可进行大数据的分析。



仪器位置：G110

负责老师：朱根凤

联系电话：31246643

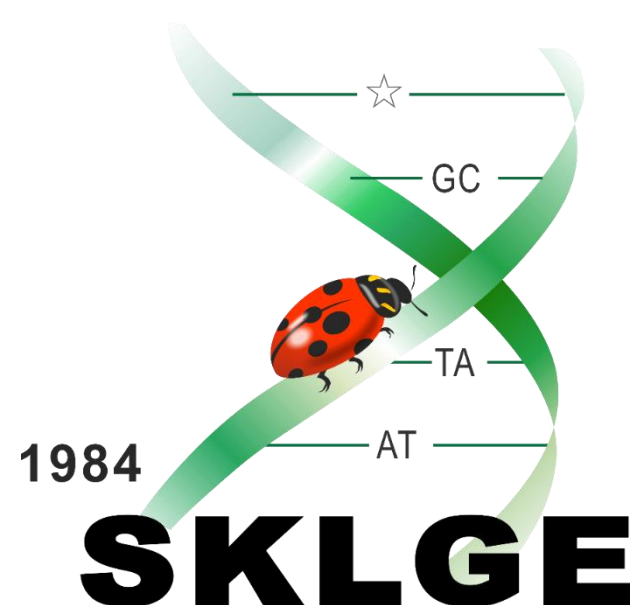
技术参数：

1. 配置多光谱摄像头和叶绿素荧光摄像头
2. 16色补光光源
390/420/450/480/525/570/630/660/730/780/850/870/890/910/940/970nm
3. 8个独立的营养液槽， 19盘/槽
4. 可测量荧光诱导曲线、快速光曲线（强大的曲线拟合功能）
5. 顶部四色LED光源与环境可控制调节不同温湿度，光源包含B450/W400-700/R660/IR730nm ±10nm，各波长可独立控制0-100%

功能应用：

1. 内建NDVI，GI…等植被指数，可应用于植被覆盖率、叶绿素浓度、植物健康度等研究。
2. 用户根据需要设定参数，自动化分群健康/疾病分布面积，并取代肉眼计算健康比率。
3. 环境条件控制：温湿度、二氧化碳和四色光谱，模拟各种环境条件。
4. 叶绿素荧光镜头可以测量的参数：Fo、 Fm、 F、 Ft、 Fv/Fm、 Y(II)、 qL、 qP、 qN、 NPQ、 Y(NPQ)、 Y(NO)、 ETR、 Abs、 NIR。
5. 植物胁迫生理学：透过特定波长光的激发和接收，分析肉眼看不见的病理影像。

仪器使用网上预约，仪器预约网址：<http://lifesupporting.fudan.edu.cn/>



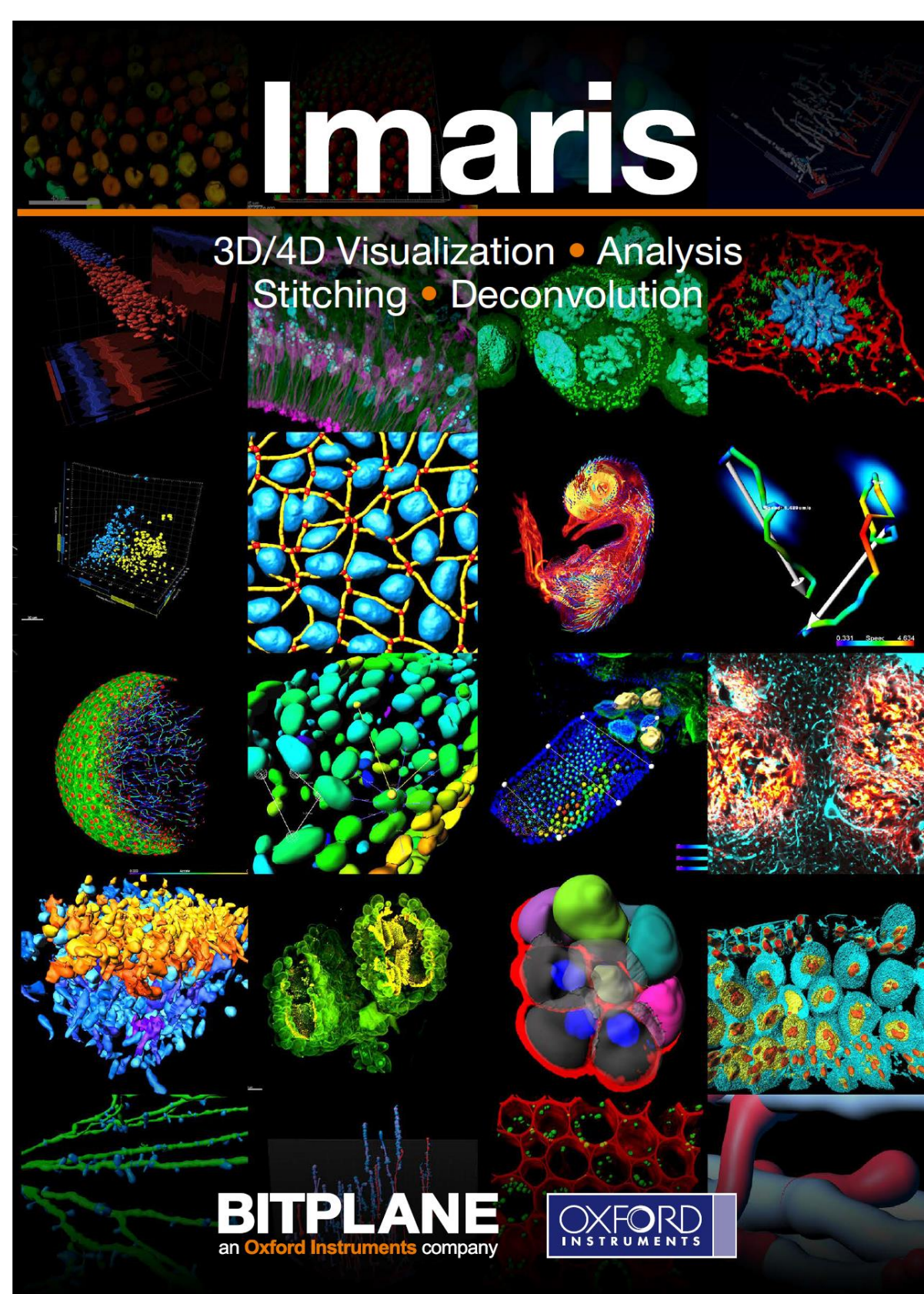
遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

显微图像分析软件Imaris

Imaris是一款多维图像渲染及交互分析软件，具备展示、分割、分析及演绎等所有3D/4D显微图像渲染所必须的功能。从对大数据的三维重构与可视化，对复杂生物结构的智能检测与空间定位，到对神经元、微丝微管、血管的精确重构，提供了多种常规软件无法得到的详实准确的数据，帮助研究者们对图像中细胞群体内复杂的组分关系和结构关系进行定量，在精细细节层次展示生物学过程及结构的变化。在细胞功能学、神经科学、血管生物学、病理学、发育学等多学科领域得到了广泛应用，能够辅助科研工作者更好的进行科学探索和研究。



位置：E101-13

负责老师：杨建鸽

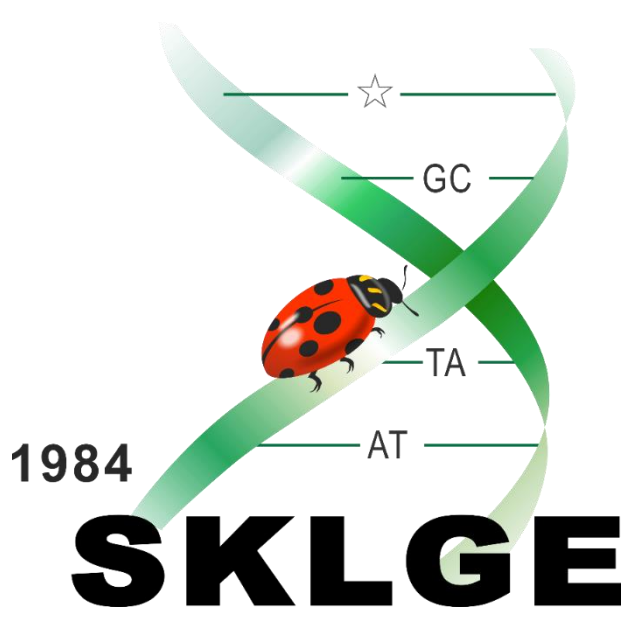
联系电话：31246565

功能应用

大数据的三维重构与展示
形态分析
神经与血管分析
多维共定位分析
反卷积
二次编程接口

信号自动检测与分割
轨迹追踪与动力学分析
细胞及其亚结构分析
组间对比
多维图像拼接
批量处理

软件使用网上预约，预约网址：<http://lifesupporting.fudan.edu.cn/>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

光学显微镜平台设备使用收费标准

设备名称	收费标准（元/小时）		
	院内	校内	校外
超分辨显微成像系统 N-SIM S	100	200	300
超分辨共聚焦显微镜 Zeiss LSM880-Airyscan	200	400	600
全光谱多光子荧光寿命成像系统 Leica TCS SP8 DIVE FALCON	200（连续成像40）	300	400
高速转盘共聚焦成像平台 Andor Dragonfly	50	80	100
超分辨率转盘共聚焦系统 Olympus/Evident SpinSR	150（连续成像50）	225	300
高内涵细胞成像和分析系统 Operetta CLS	50	80	100
全光谱高分辨激光共聚焦成像系统 Leica STELLARIS 5	120	240	360
激光扫描共聚焦显微镜Olympus FV3000	120	240	360
正置激光扫描共聚焦显微镜 Nikon A1	120	240	360
高感度激光扫描共聚焦显微镜 Zeiss LSM710	100	200	300
共聚焦显微镜 Leica TCS SP8	60	200	300
倒置荧光显微镜 OLYMPUS IX71	20	40	60
倒置荧光显微镜 OLYMPUS IX73	20	40	60
正置荧光显微镜 Nikon Eclipse Ni-U	20	40	60
激光捕获显微切割仪 ArcturusXT™	100	200	300
变倍体视显微镜 Zeiss Axio	20	40	60
调制叶绿素荧光成像系统MAXI-IMAGING-PAM	20	40	60
植物活体成像仪Berthold NightSHADE LB985	5（开机费15）	10	20
植物幼苗高通量动态成像分析系统 DynaPlant®	10	20	30

服务案例1---mHTT和LC3蛋白共定位分析

复旦大学鲁伯坝教授课题组于 Nature 杂志上发表题为“Alleleselective lowering of mutant HTT protein by HTT-LC3 linker compounds”的文章 (2019 Nov; 575(7781): 203-209. doi: 10.1038/s41586-019-1722-1.)。在研究过程中，鲁伯坝教授课题组使用了国重平台的超分辨共聚焦显微镜 Zeiss LSM880，利用488nm和561nm荧光共染的方式，证实小分子化合物10O5和AN2能够增加mHTT和LC3两种蛋白的共定位。利用Zeiss LSM880的高分辨率拍摄，能够有效地去杂背景与杂信号，获得更加清晰的细胞内部的蛋白puncta，确保了后续蛋白质共定位分析的准确性。另外，通过ZEN软件以及Image J的分析插件，还可以精确地计算出所拍摄的图片中黄色点（红色和绿色重合）和红色点数量的比值。

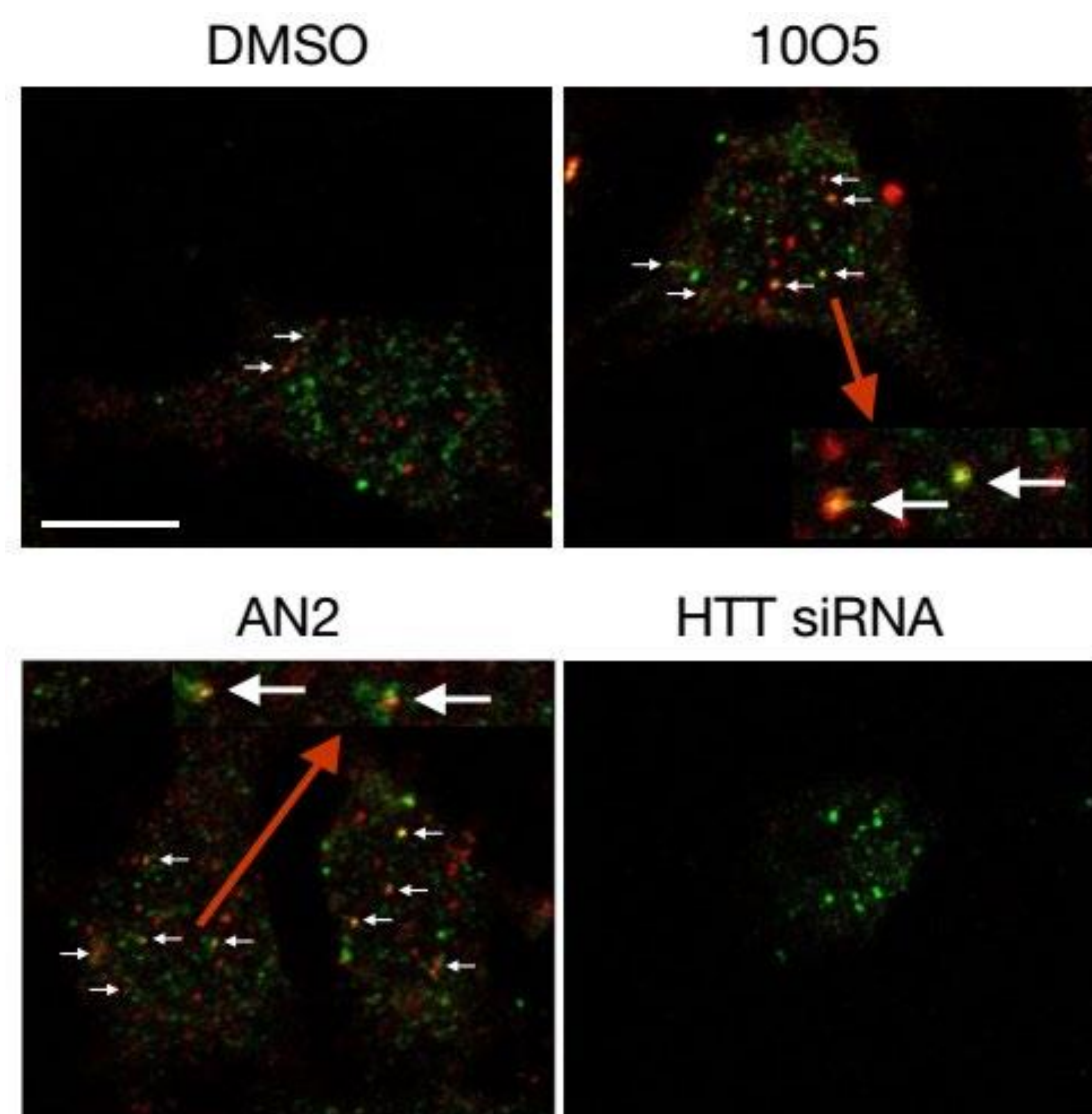
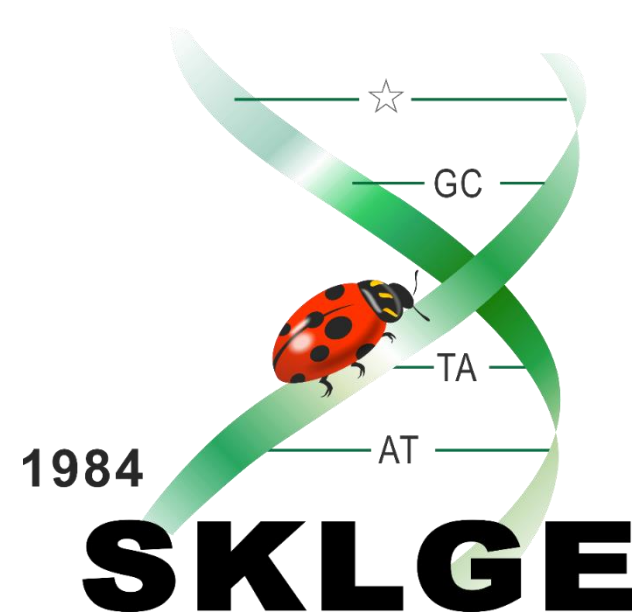


图1. mHTT-LC3连接化合物10O5、AN2显著增加mHTT蛋白（红色）和LC3蛋白（绿色）的共定位。



Zeiss LSM880 with Airyscan
超分辨共聚焦显微镜



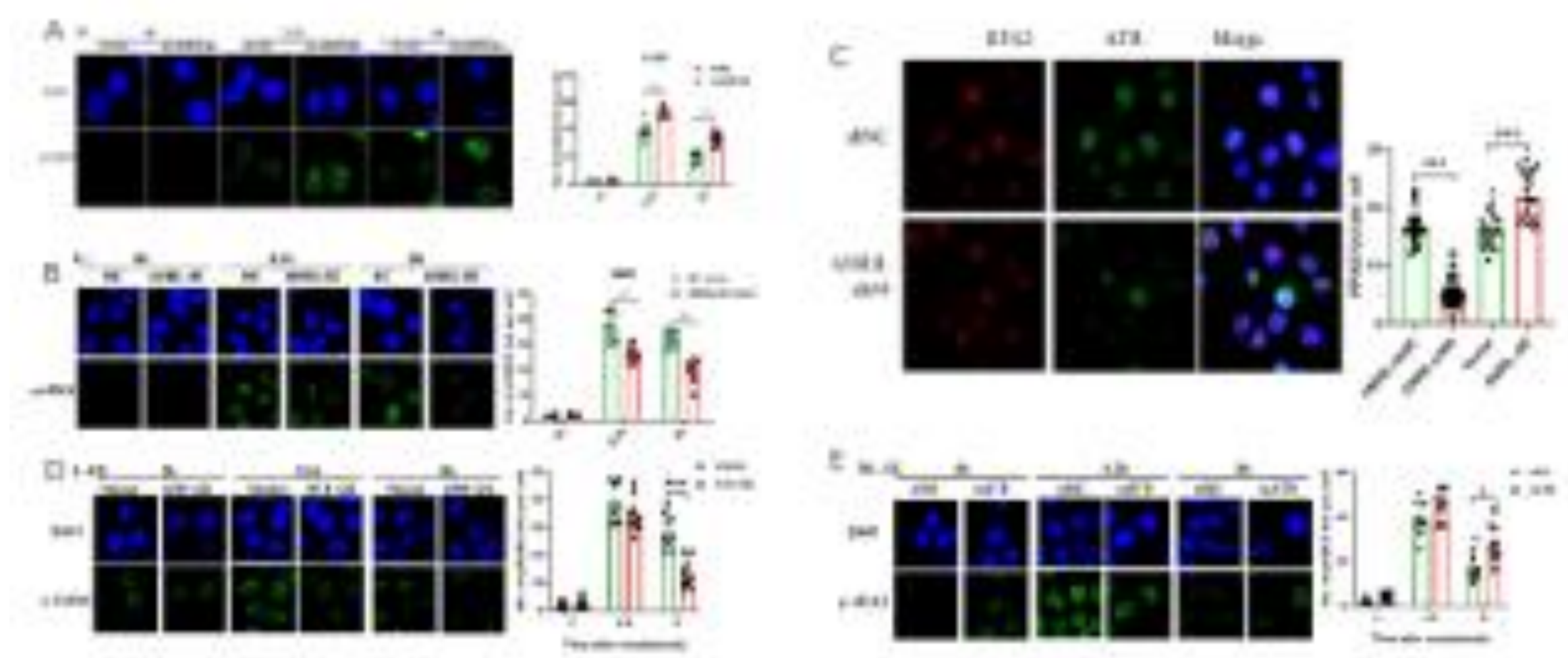
遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

服务案例2---DNA损伤修复的研究

中国人民解放军海军军医大学杨彦勇教授课题组于Molecular Cancer杂志上发表题为“Long non-coding RNA ANRIL promotes homologous recombination-mediated DNA repair by maintaining ATR protein stability to enhance cancer resistance”的文章(Liu et al. Molecular Cancer (2021) 20:94)。在研究过程中，杨教授课题组利用国重平台的超分辨共聚焦显微镜Zeiss LSM880 with Airyscan，验证了长链非编码 RNA ANRIL会影响DNA损伤修复。通过荧光染色的方法，检测ANRIL对DNA损伤修复蛋白 γ -H2AX、RPA2以及ATR等蛋白在核内的募集情况的影响。

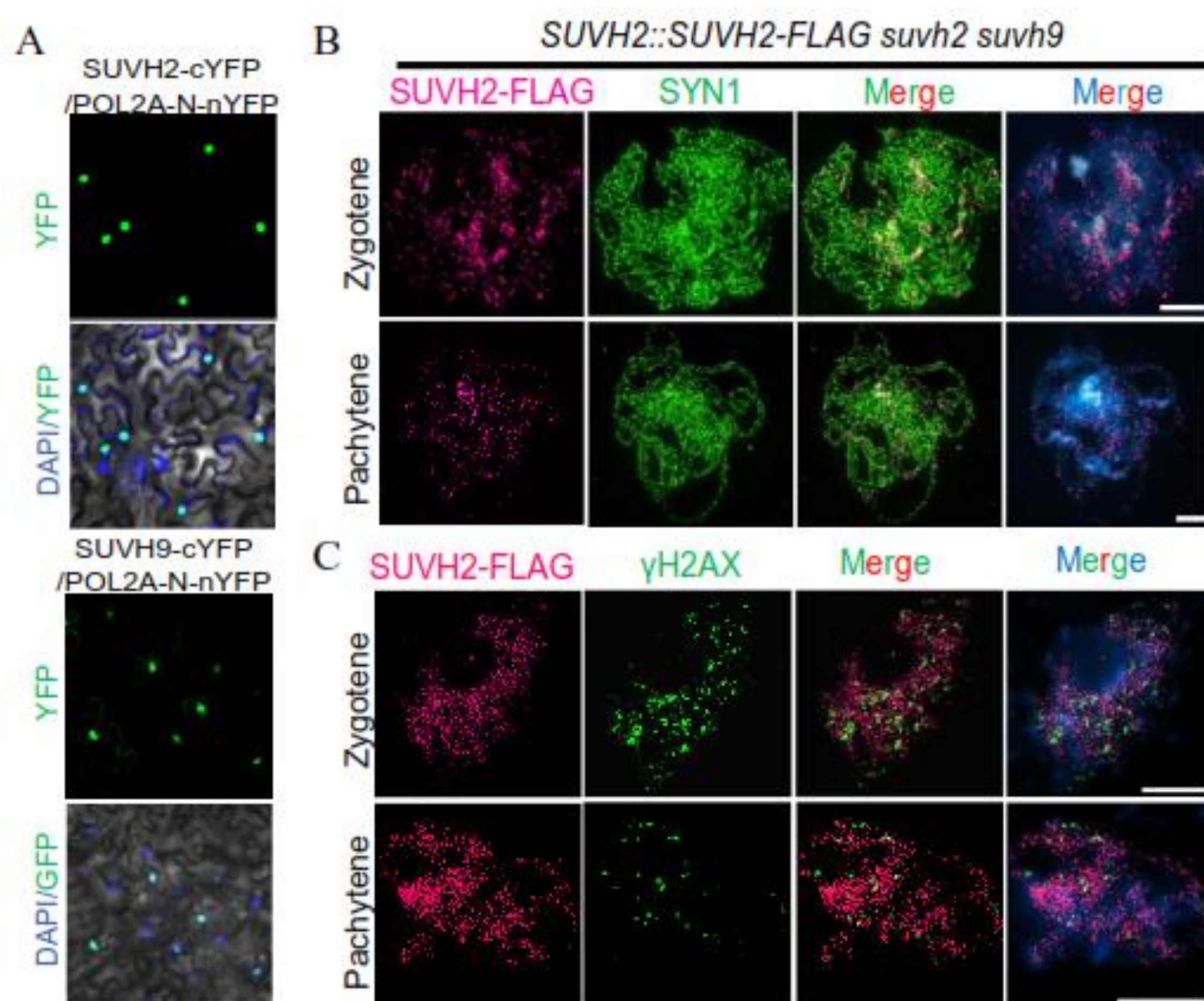


- A) ANRIL的表达对DNA损伤修复关键蛋白的募集影响
B) ANRIL分子的敲低和过表达影响核内 γ -H2AX的募集
C) ANRIL分子的敲低影响核内RPA2和ATR的募集
D, E) ANRIL和ATR共同影响核内 γ -H2AX的募集

Zeiss LSM880 with Airyscan
超分辨共聚焦显微镜

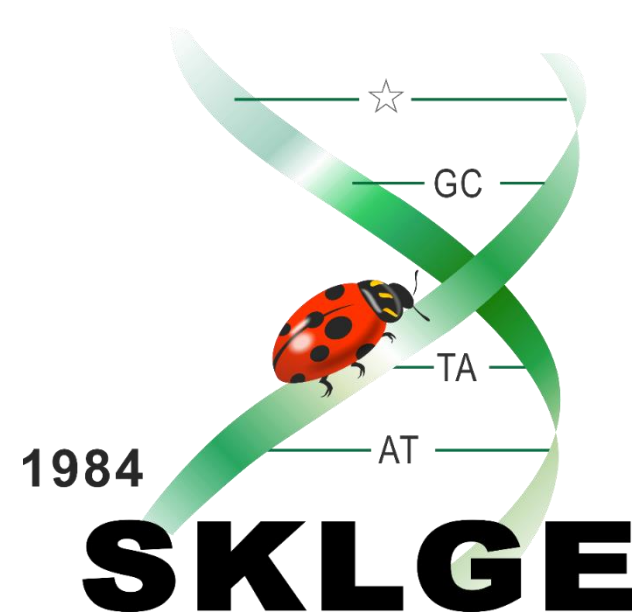
服务案例3---蛋白互作验证与蛋白质定位研究

复旦大学王应祥教授课题组于PNAS杂志上发表题为“DNA polymerase epsilon interacts with SUVH2/9 to repress the expression of genes associated with meiotic DSB hotspot in Arabidopsis”的文章（C. Wang et al., Y. Wang, PNAS, 2022, <https://www.pnas.org/doi/full/10.1073/pnas.2208441119>）。该研究利用国重平台的Leica TCS SP8共聚焦显微镜对互作蛋白POL2A和SUVH2在烟草叶片中的荧光共定位进行观察；并且同时利用Nikon N-SIM S 超分辨显微镜（Structured Illumination Microscopy），对SUVH2蛋白在植物减数分裂染色体上的共定位信号进行了观察，并发现了SUVH2在减数分裂时期和 γ -H2AX标记的DSB共定位。为探究其在减数分裂中的功能提供有力证据。



尼康SIM超分辨显微镜

- (A) BiFC验证POL2A的N端和SUVH2/SUVH9在烟草叶片中相互作用；
(B) SUVH2-FLAG和粘连蛋白SYN1在减数分裂偶线期和粗线期的定位；
(C) SUVH2-FLAG在减数分裂时期和 γ -H2AX标记的DSB部分共定位。
Scale Bar=5 μ m



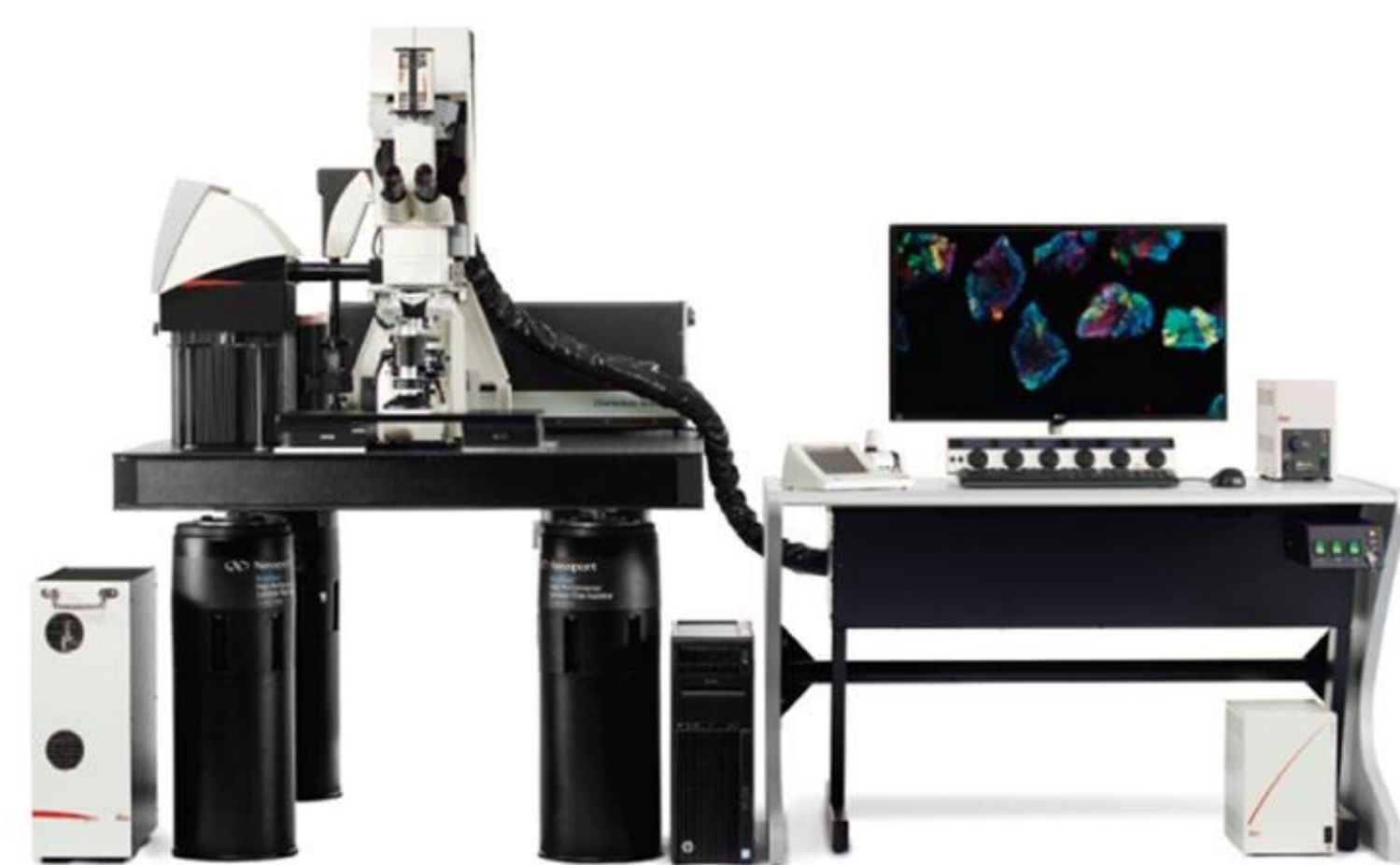
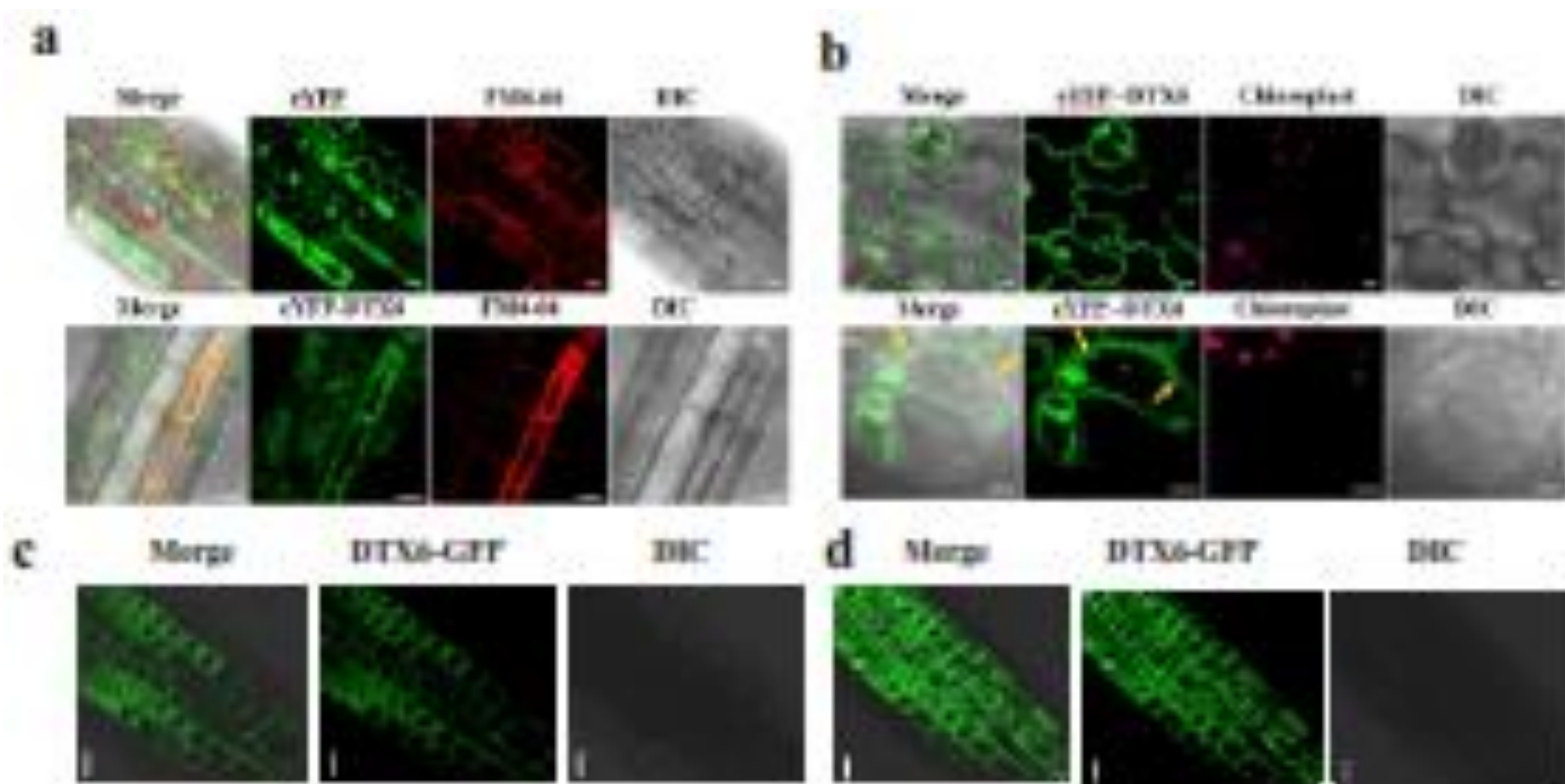
遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

服务案例4---DTX6亚细胞定位观察

- 复旦大学葛晓春教授课题组于Molecular Plant杂志上发表题为“Changing Gly311 to acidic amino acid in the MATE family protein DTX6 leads to enhanced resistance of Arabidopsis to the dihydropyridine herbicides”的文章（Zeyu Lv et al. , Molecular Plant, 2021, DOI:<https://doi.org/10.1016/j.molp.2021.09.002>）。在研究过程中，葛晓春教授课题组利用国重平台的Leica 全光谱多光子荧光寿命成像系统Leica TCS SP8 DIVE FALCON，检测多药外排家族成员DTX6在拟南芥根及叶片中的亚细胞定位，最终确定DTX6定位于内膜运输系统，清晰的定位信息为后续DTX6转运吡啶类除草剂机理阐释打下重要基础，本研究揭示了杂草进化除草剂抗性的潜在机制，也为通过基因工程手段来改造作物的除草剂抗性提供了一个非常有应用前景的基因。



DTX6亚细胞定位;(a)根中DTX6定位；（b）
叶片中DTX6定位；(c) PQ处理前DTX6定位；
（d） PQ处理后DTX6定位

全光谱多光子荧光寿命成像系统
Leica TCS SP8 DIVE FALCON

服务案例5---利用光漂白恢复实验检测CAG repeat RNA在胞质中的聚集

复旦大学鲁伯坝教授课题组于Nature Chemical Biology杂志上发表题为 ‘The Gelation of Cytoplasmic CAG Repeat Expansion RNAs Suppresses Global Protein Translation’ 的文章（<https://www.nature.com/articles/s41589-023-01384-5>）。课题组在研究中为了实时长时间观测细胞内大分子聚集体的动态变化，利用国重平台的超分辨共聚焦显微镜Dragonfly高速转盘共聚焦活细胞工作站成功采集到有效的研究图像。具体说来该工作站可在较长时间内保证样品正常的生理活性，研究人员在设定层扫参数，采样频率，采样波长，和采样区域等参数后，仪器可连续自动采集多时间点，多通道，多区域的活细胞内部高分辨率图像，有效呈现细胞内生物大分子聚集体的动态变化。

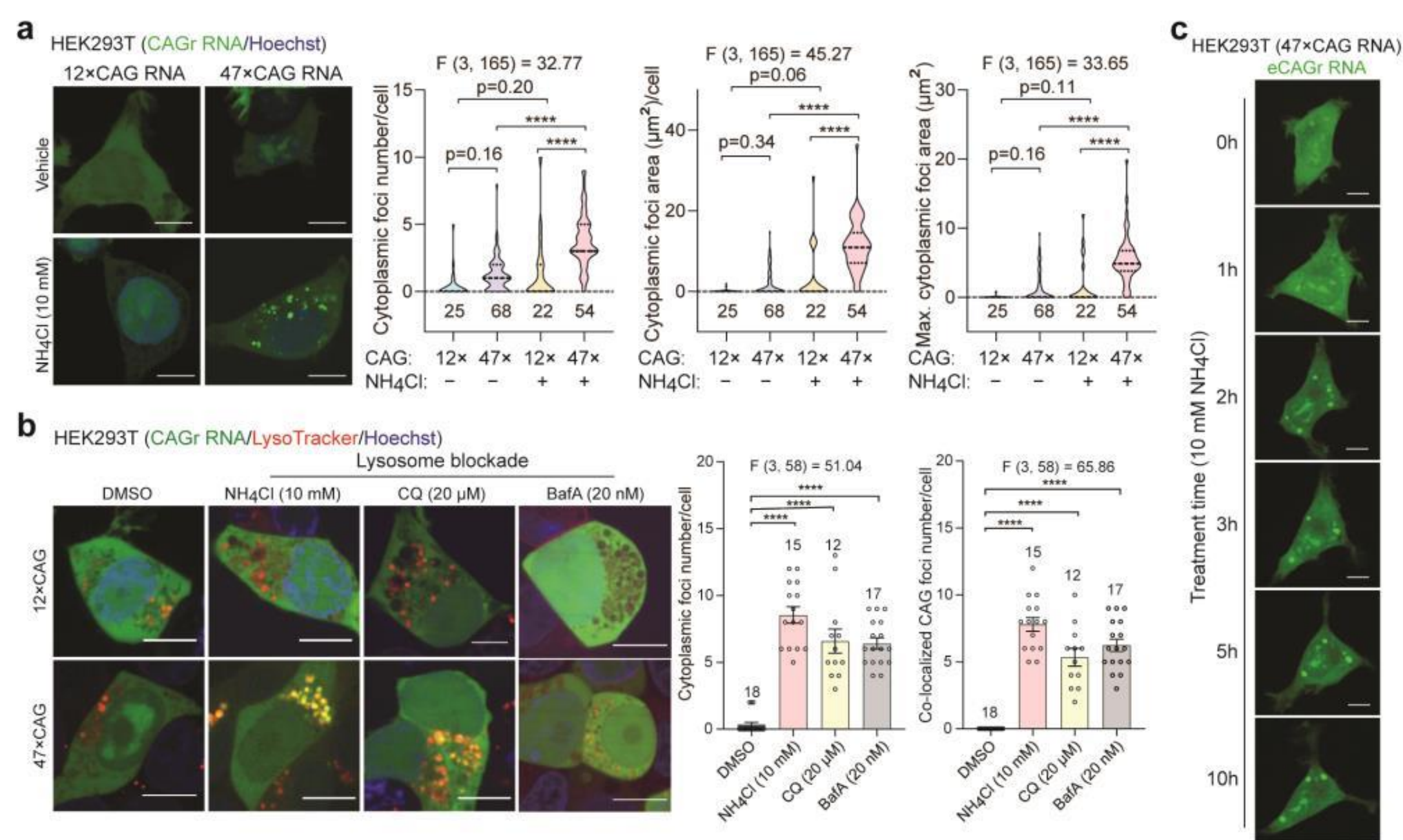
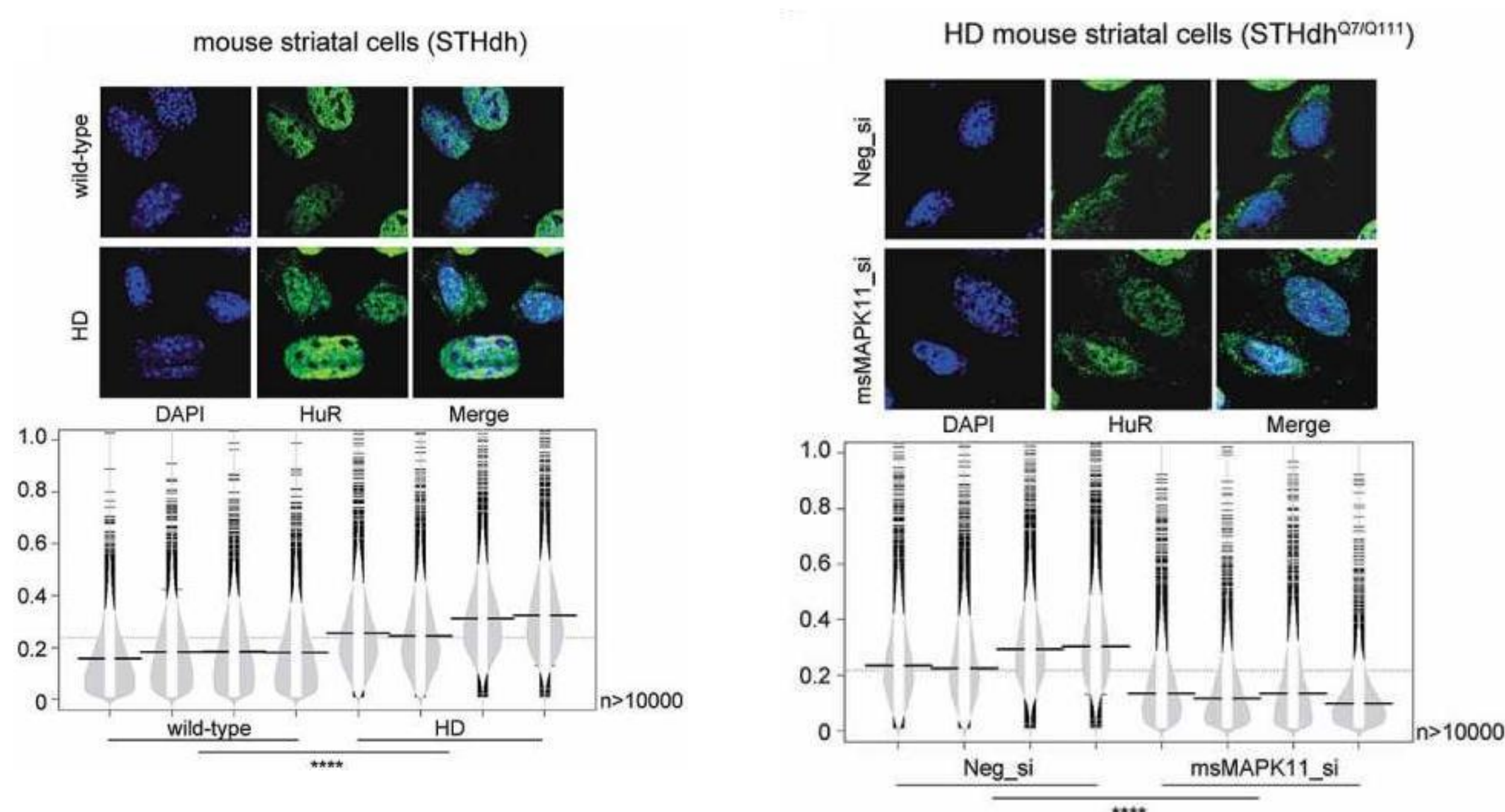


Fig.1 The eCAGr RNA forms cytoplasmic gel-like condensates degraded by the lysosomes.

高速转盘共聚焦成像平台Andor Dragonfly

服务案例6---蛋白表达定位与定量的高通量分析

- 复旦大学鲁伯坝研究员课题组在RNA Biology杂志上发表题为“HuR stabilizes HTT mRNA via interacting with its exon 11 in a mutant HTT-dependent manner”的文章（Quan Zhao et al., RNA Biology, (2020) 17(4):500-516.）在研究过程中，鲁伯坝研究员课题组利用国重平台的高内涵共聚焦荧光显微镜（Operetta CLS System, PerkinElmer），检测了疾病细胞与野生型细胞的差别，以及疾病细胞中MAPK11基因对RNA结合蛋白HuR出核的调控作用。在本案例中，研究者利用国重平台的高内涵细胞成像和分析系统，一次性检测了近2万个细胞的HuR出核情况进行了定量分析，快速获得了明确结论，并获得了可发表的图片。

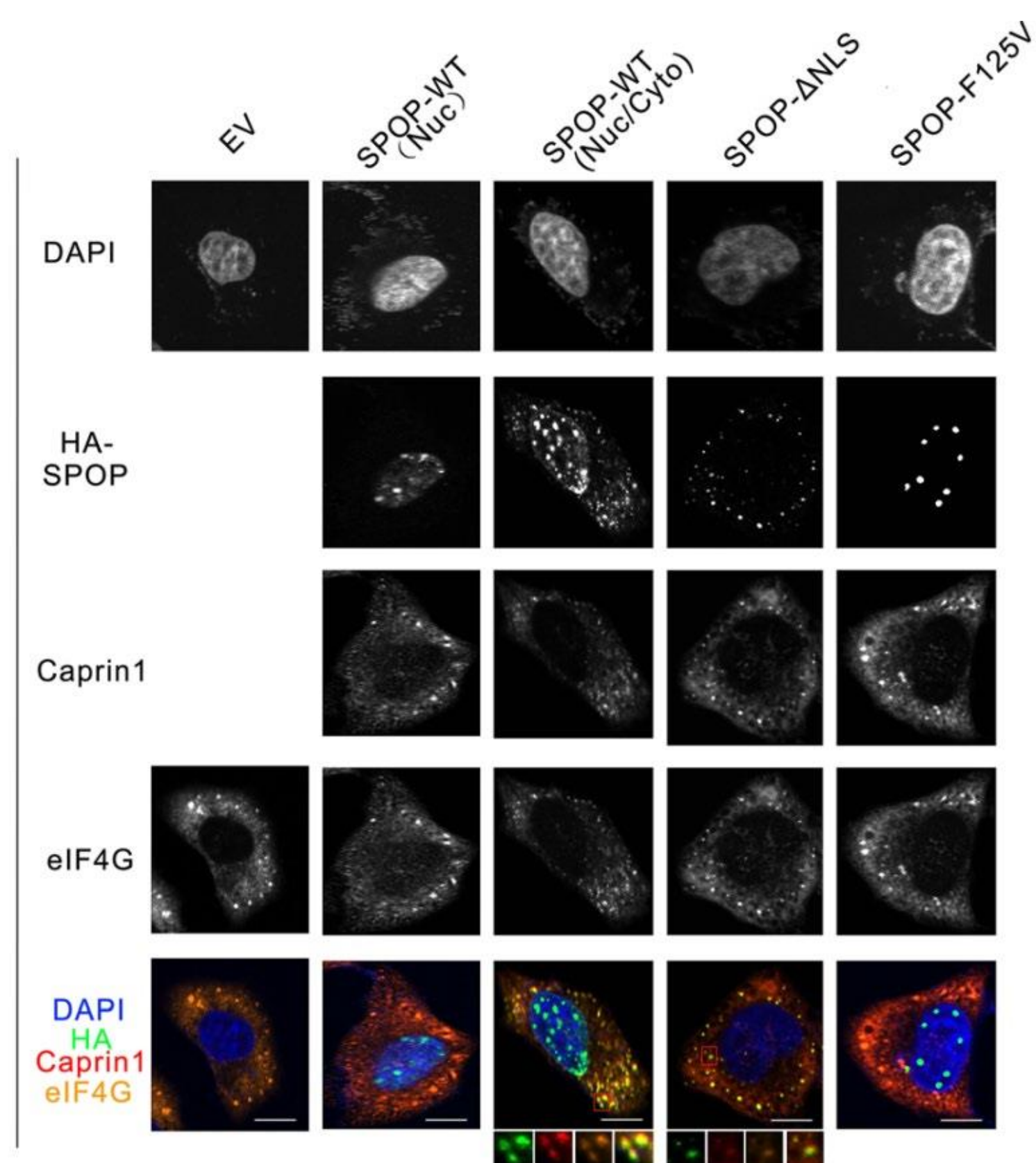


高内涵细胞成像和分析系统

图1.小鼠纹状体细胞中HuR蛋白分布情况。左图为野生型细胞与亨廷顿病（HD）细胞的比较，HD细胞中HuR出核显著增加。上方为代表性图，下方为统计分布，统计了近20000个细胞；右图为HD细胞中敲低小鼠MAPK11与对照的比较。敲低后HuR出核明显降低。HuR的出核变化并不剧烈，而且出核蛋白比例的图像分析很困难。利用高内涵显微镜可以很快的进行此类实验数据收集和分析，迅速得到上万个细胞的结果，从而获得结论。

服务案例7---蛋白互作与细胞内应激颗粒蛋白分析

- 复旦大学李瑶教授课题组于 Molecular Cancer 杂志上发表题为 “Prostate Cancer-associated SPOP mutations enhance cancer cell survival and docetaxel resistance by upregulating Caprin1-dependent stress granule assembly” 的文章 (2019 Nov 26;18(1):170.doi:10.1186/s12943-019-1096-x.)。在研究过程中，李瑶教授课题组利用国重平台的超分辨共聚焦显微镜 Zeiss LSM710，对蛋白在细胞中的定位情况进行了分析，并在此基础上分析了SPOP基因突变对细胞中的非膜结构--应激颗粒（stress granules,SGs)的形成影响。通过四个荧光通道（405nm/488nm/561nm/647nm）共染的方式，确立多蛋白互作鉴定方法。利用Zeiss LSM710的高分辨率拍摄，能够有效的去除杂背景与杂信号，更加清晰地拍摄出细胞内部的颗粒结构，提高了后续对颗粒分析的准确性，这使得检测细胞内颗粒状蛋白或者一些无膜结构的相分离结构变得简单，后面再通过ZEN软件以及Image J的颗粒分析插件可以计算颗粒结构的面积与细胞总面积的比值，从而达到观测其颗粒指数的目的。

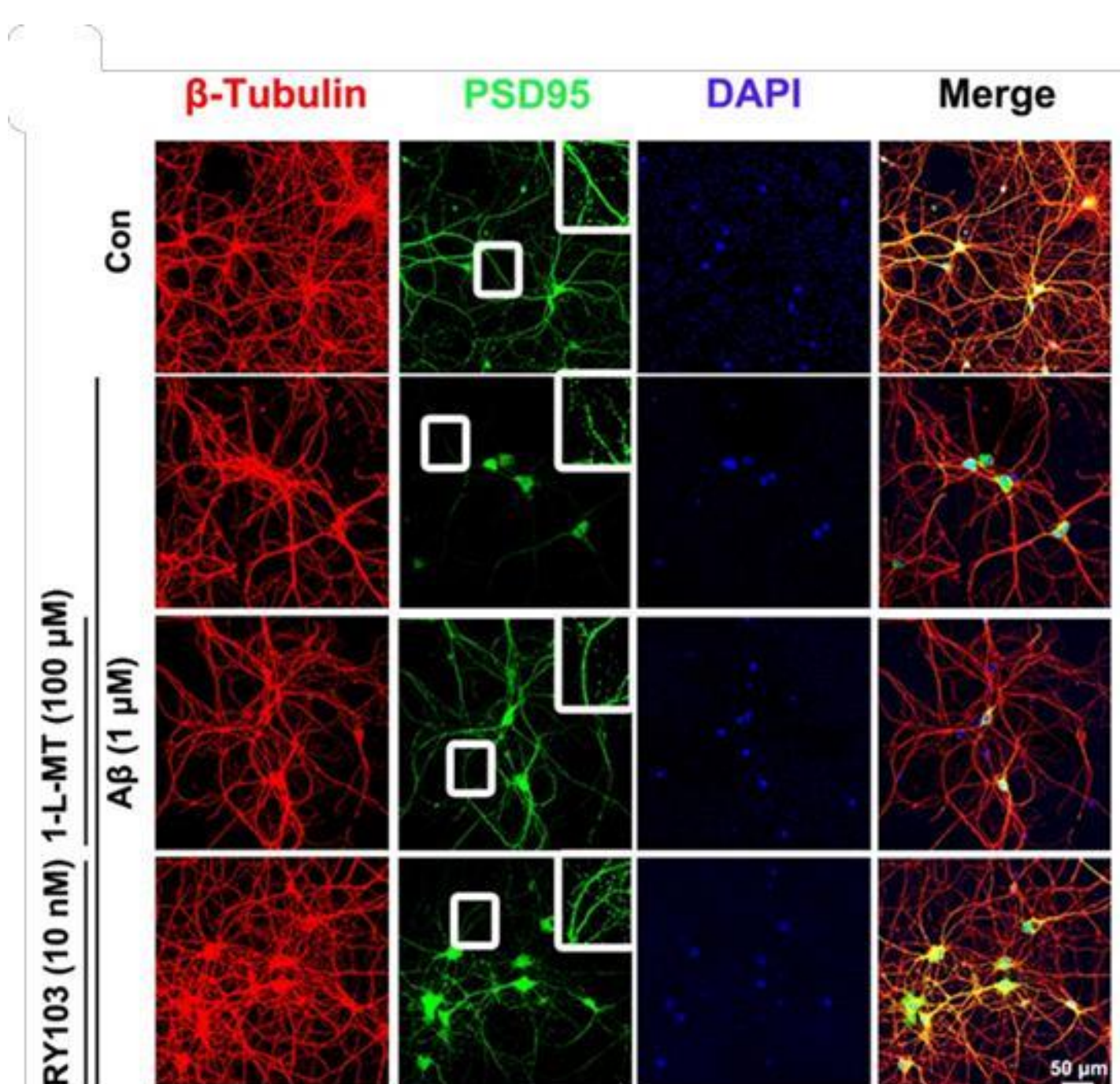
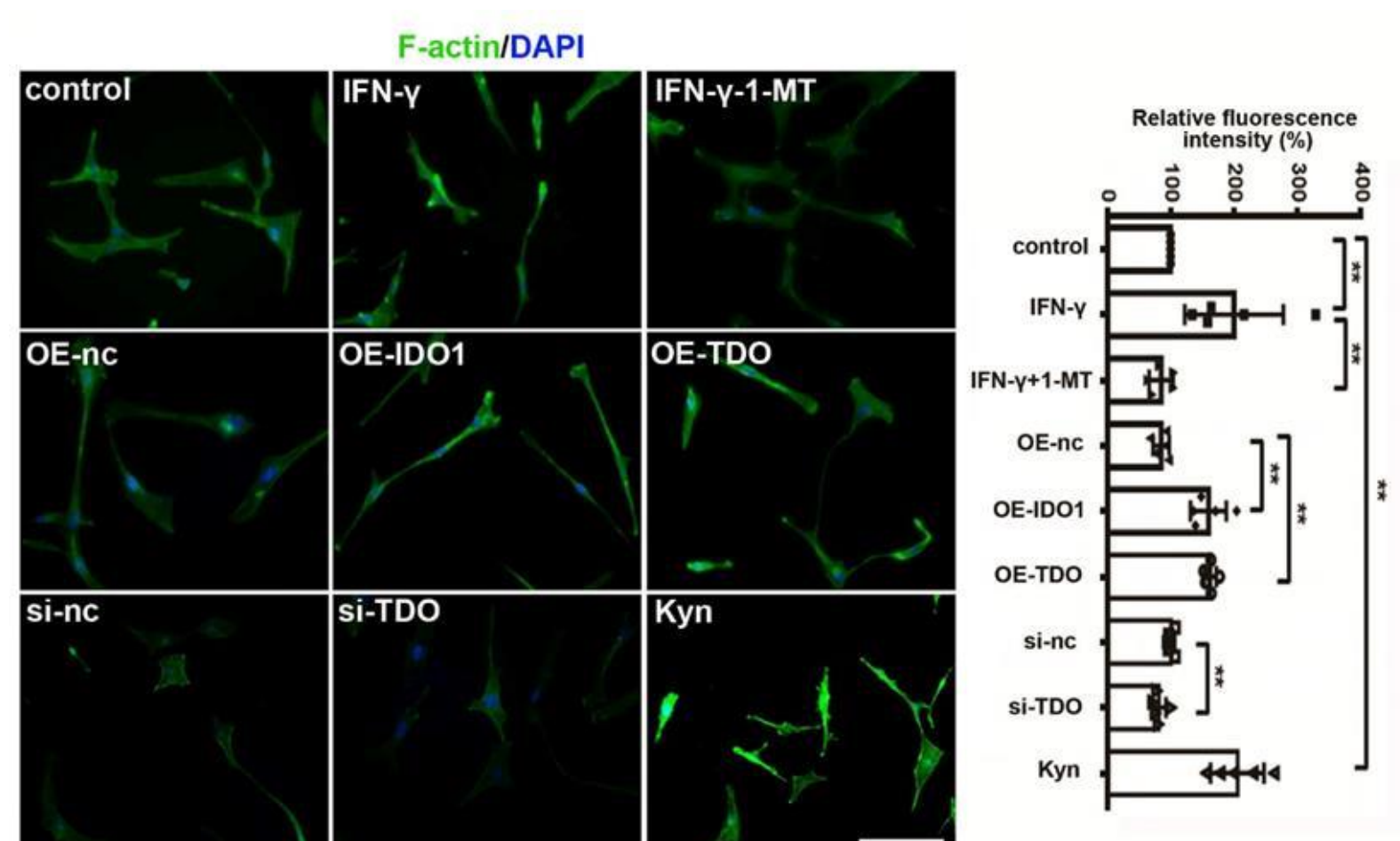


Zeiss LSM710
高感度激光扫描共聚焦显微镜

图1. SPOP-野生型、缺失核定位序列的突变体 (Δ NLS) 和前列腺癌来源的突变体F125V对细胞应激颗粒形成的影响。

服务案例8---细胞微细结构和形态学变化分析

复旦大学杨青教授课题组于Nature子刊Signal Transduction and Targeted Therapy（医学一区，IF=13.493）杂志上发表了两篇文章，分别为“Both IDO1 and TDO contribute to the malignancy of gliomas via the Kyn–AhR–AQP4 signaling pathway”（2020： 5(10), <https://doi.org/10.1038/s41392-019-0103-4>)和“Amyloid β neurotoxicity is IDO1–Kyn–AhR dependent and blocked by IDO1 inhibitor”（2020： 5 (96); <https://doi.org/10.1038/s41392-020-0188-9>）。在研究过程中，杨青教授课题组使用了平台的Zeiss LSM710高感度共聚焦显微镜，通过高分辨率拍照，获得了更加清晰的细胞微细结构和形态学变化，大大提高了实验结果的精确度。另外，通过ZEN软件和Image J分析插件对免疫荧光强度的分析，可以量化神经元损伤的程度以及蛋白表达变化的程度。

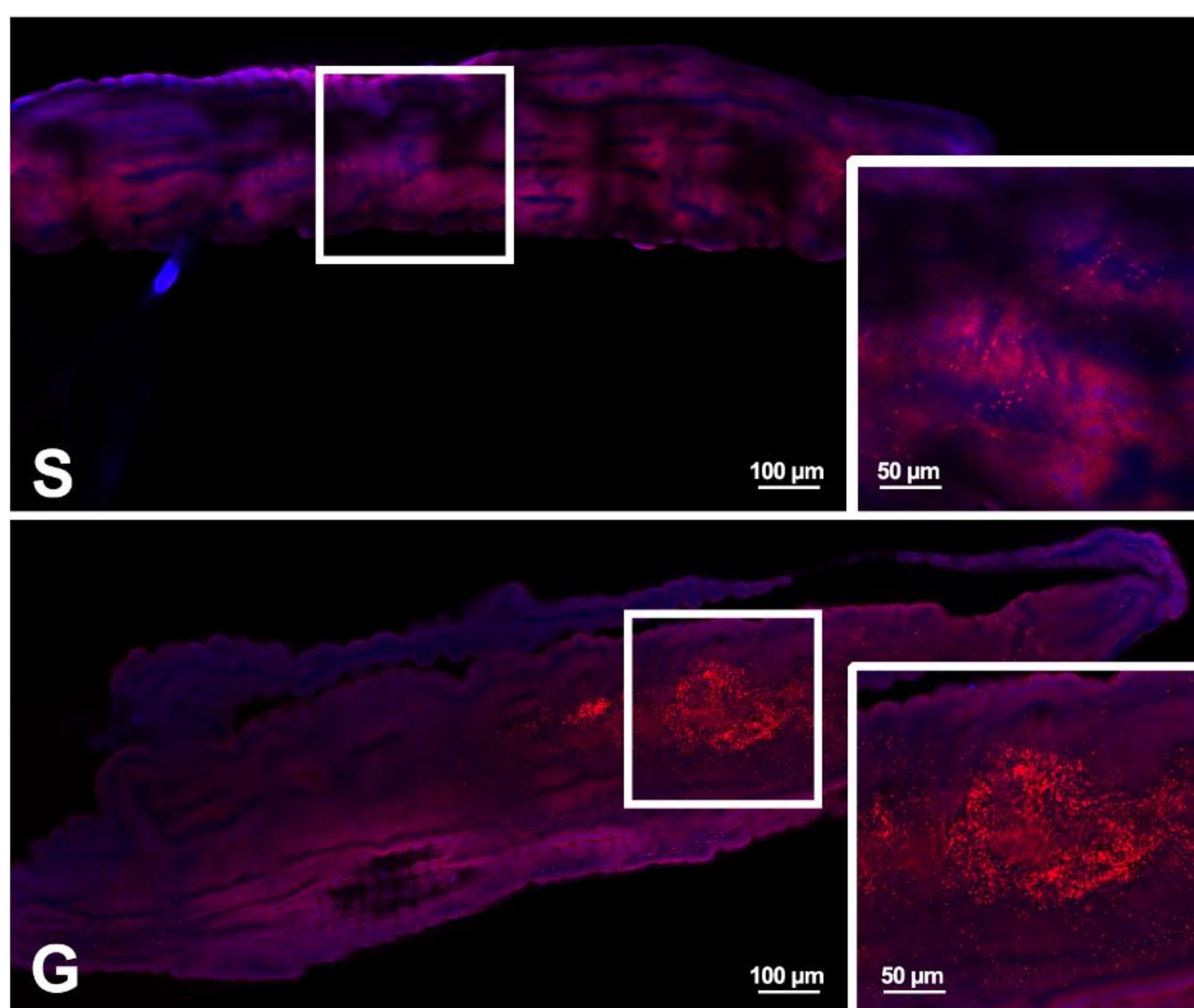


Zeiss LSM710
高感度激光扫描共聚焦显微镜

Figure. 1 The protective effect of IDO1 inhibitor on synaptic plasticity of A β -impaired primary hippocampal neurons.

服务案例9---按蚊中肠的全方位扫描

- 复旦大学王敬文研究员课题组于Cell Reports杂志上发表题为‘Glucose-mediated expansion of a gut commensal bacterium promotes Plasmodium infection through increasing mosquito midgut pH’的文章 (MF. Wang et al. JW. Wang, Cell Reports, 2021)。在研究过程中，王敬文课题组利用国重平台的尼康正置激光扫描共聚焦显微镜A1(Laser Scanning Confocal Microscope Nikon A1)，检测了喂食不同糖饮食后按蚊中肠内共生菌Asaia bogorensis的组织定位和丰度变化。在本案例中，研究生利用国重平台的激光扫描共聚焦显微成像和分析系统，在荧光原位杂交的样本上，对按蚊中肠这一特殊的昆虫器官在进行了全方位的扫描，直观呈现出饮食差异对按蚊中肠共生菌的显著影响，获得了明确结论，并获得了高质量、可发表的图片。

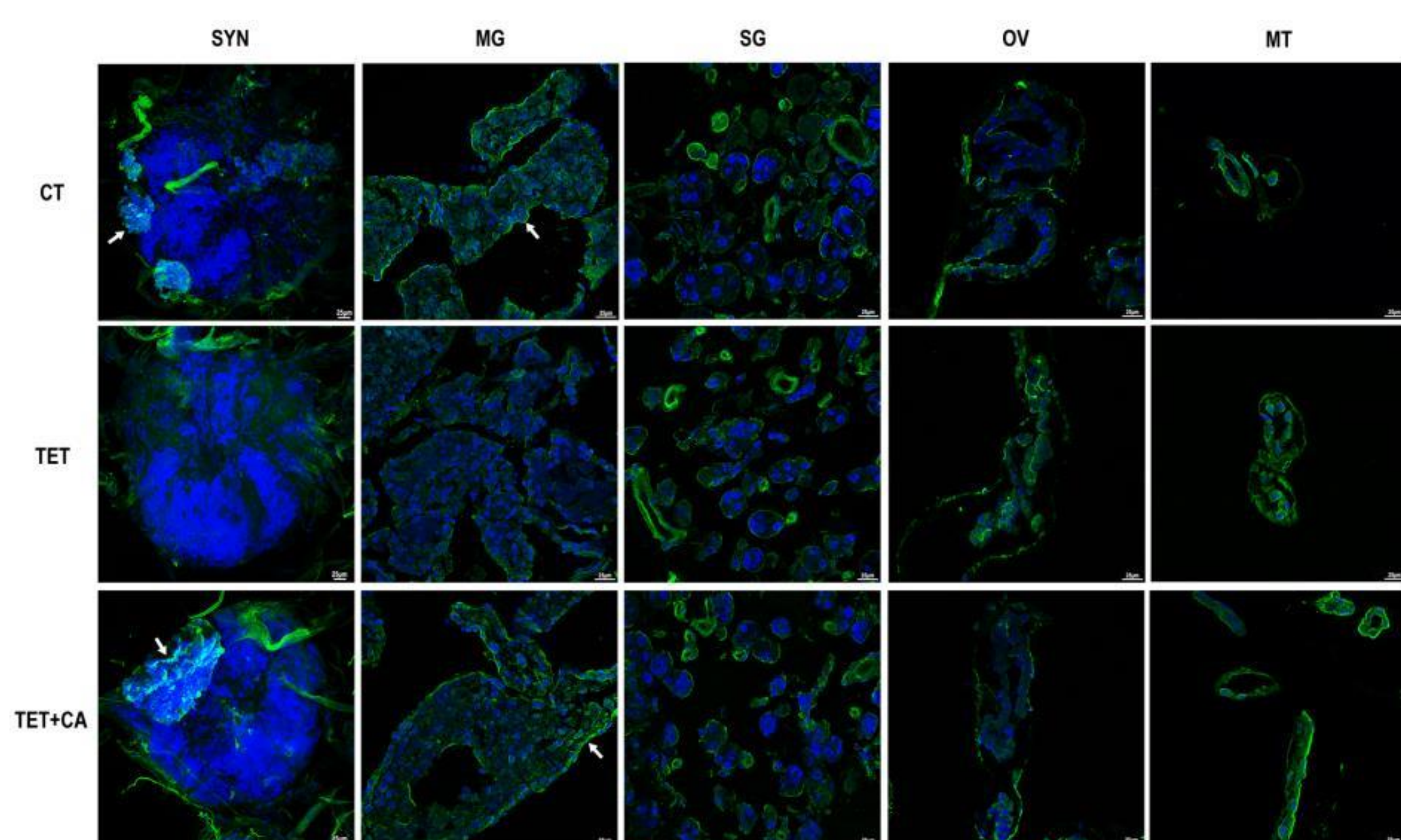


尼康正置激光扫描共聚焦显微镜

图1：喂食不同糖后按蚊中肠内Asaia bogorensis的组织定位;(S)喂食2%蔗糖的按蚊中肠；（G）喂食2%蔗糖 + 0.1 M葡萄糖的按蚊中肠；(蓝色) 细胞核DAPI;(红色) Asaia bogorensis荧光标记. 右边方框内展示了局部放大。

服务案例10---蜱虫体内五羟色胺分泌的定位

- 复旦大学王敬文研究员课题组于Cell Host & Microbe杂志上发表题为‘Symbiont-regulated serotonin biosynthesis modulates tick feeding activity’的文章 (ZW. Zhong et al. JW. Wang, Cell Host & Microbe, 2021)。在研究过程中，王敬文课题组利用国重平台的尼康正置激光扫描共聚焦A1 Nikon DIGITAL SIGHT DS-U3，检测了抗生素处理后长角血蜱各组织的五羟色胺变化。在本案例中，研究生利用国重平台的超分辨率共聚焦显微成像和分析系统，在免疫组化的样本上，对长角血蜱各组织进行了全方位的扫描，直观呈现出抗生素处理对长角血蜱肠道与合神经节内五羟色胺含量的显著影响，获得了明确结论，并获得了高质量、可发表的图片。



尼康正置激光扫描共聚焦显微镜

图1.用0.9%NaCl (CT)、四环素 (TET) 和四环素补充分支酸 (TET+CA) 处理的成蜱中5-HT (绿色) 的组织定位。SY，合神经节；MG，中肠；SG，唾液腺；OV，卵巢；MT，马氏管。细胞核用DAPI (蓝色) 染色。箭头表示5-HT。

服务案例11---膜污染物的3D结构成像

同济大学污染控制与资源可利用国家重点实验室王亚宜课题组在对MBR中膜生物污染控制的研究中制备出一种纳米光催化剂改性的PVDF超滤膜，该膜在可见光的照射下可有效减轻有机污染物造成的膜孔阻塞，并对附着的细菌有良好的杀灭作用，显著抑制膜表面生物膜的形成，实现良好的膜污染控制效果。研究成果“Novel strategy for membrane biofouling control in MBR with CdS/MIL-101 modified PVDF membrane by in situ visible light irradiation.”于2021年在《Water Research》发表。实验中使用平台的Olympus FV3000激光扫描共聚焦显微镜，对污染的对照膜（C0）和改性膜（C2）分别进行逐点逐层扫描，并在整个膜厚度内进行3D立体结构成像，可见在C0中覆盖大量活的微生物细胞而C2中几乎没有活细菌，说明C2的光催化能力有效杀死了附着的细菌并降解了沉积的有机污垢。

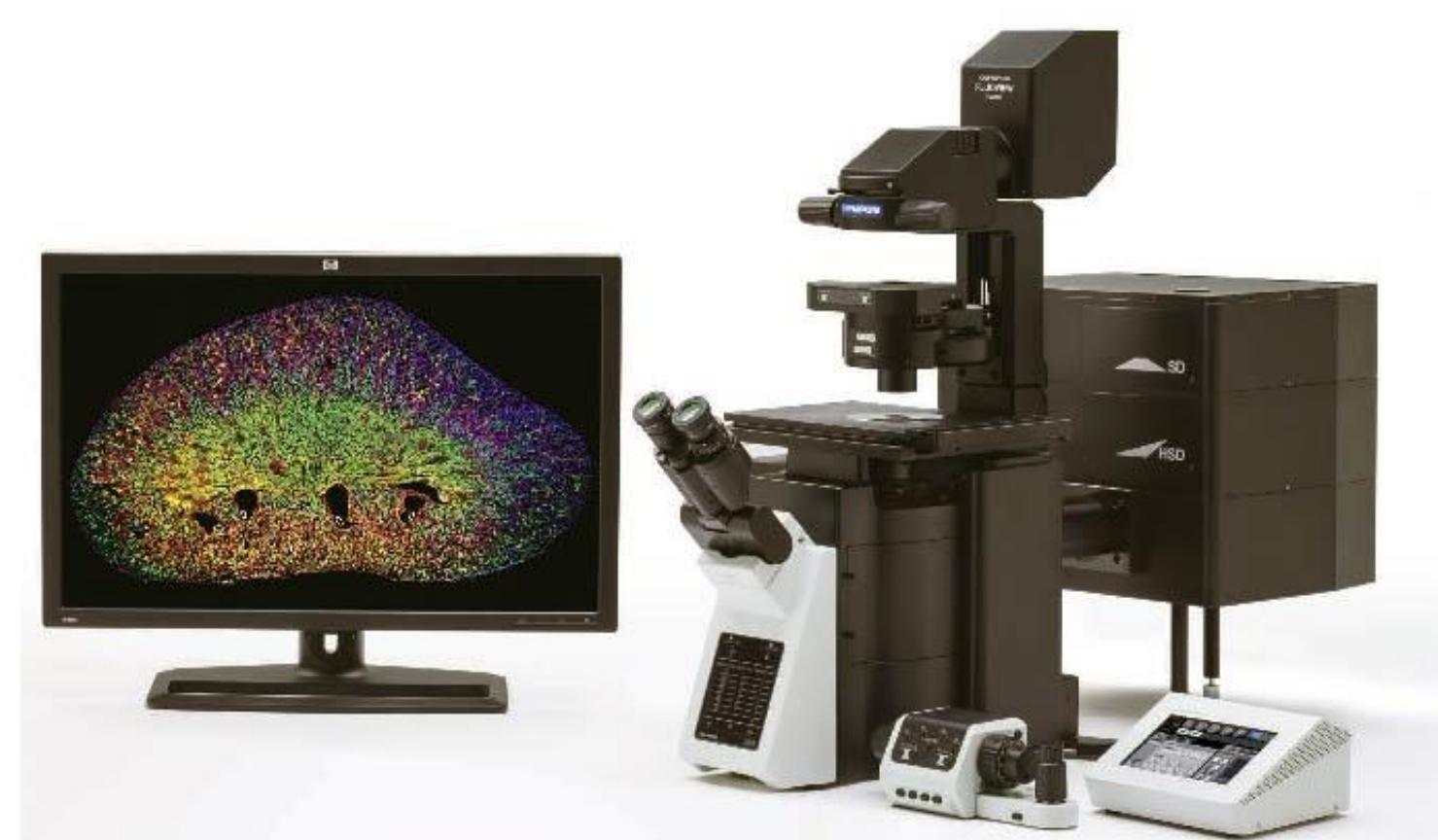
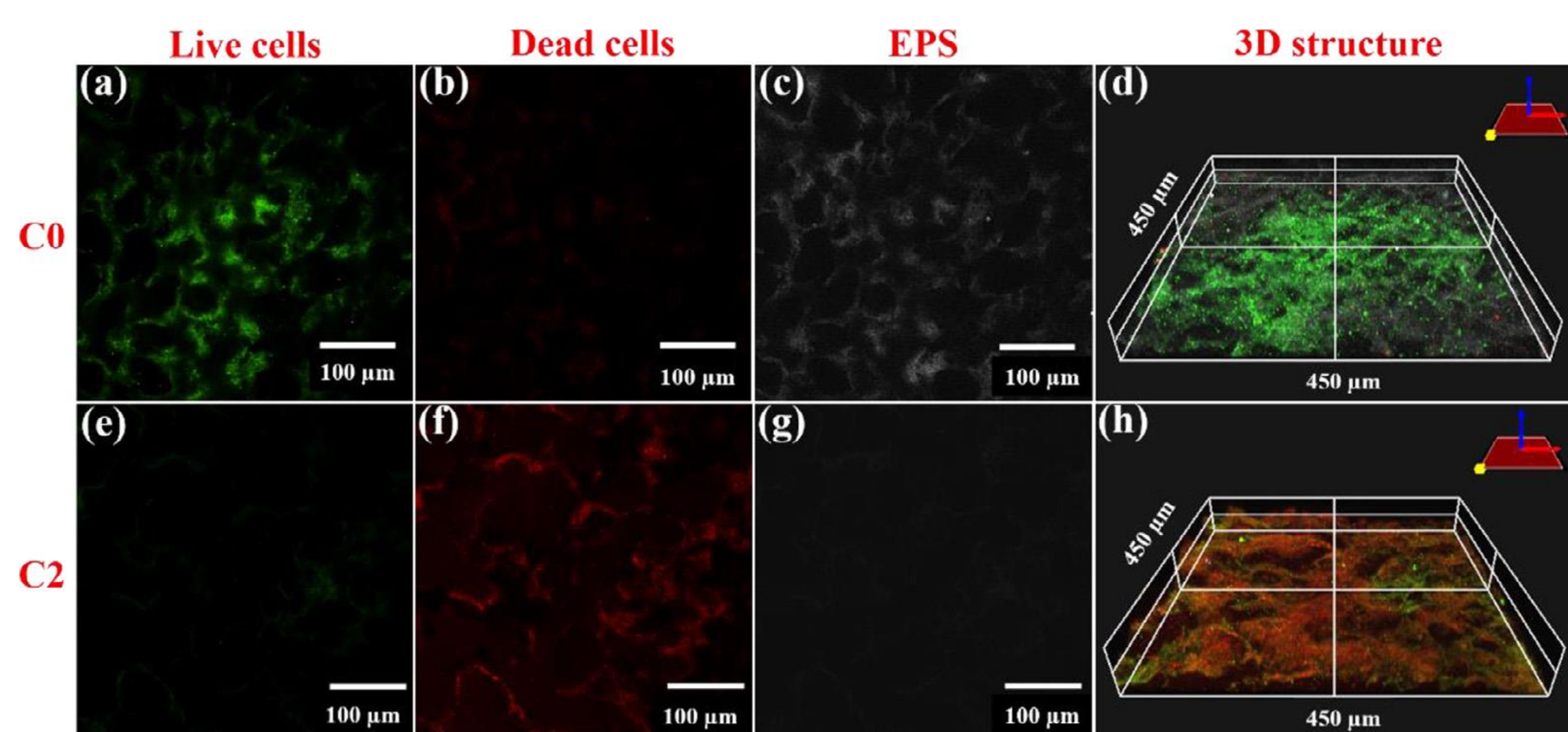


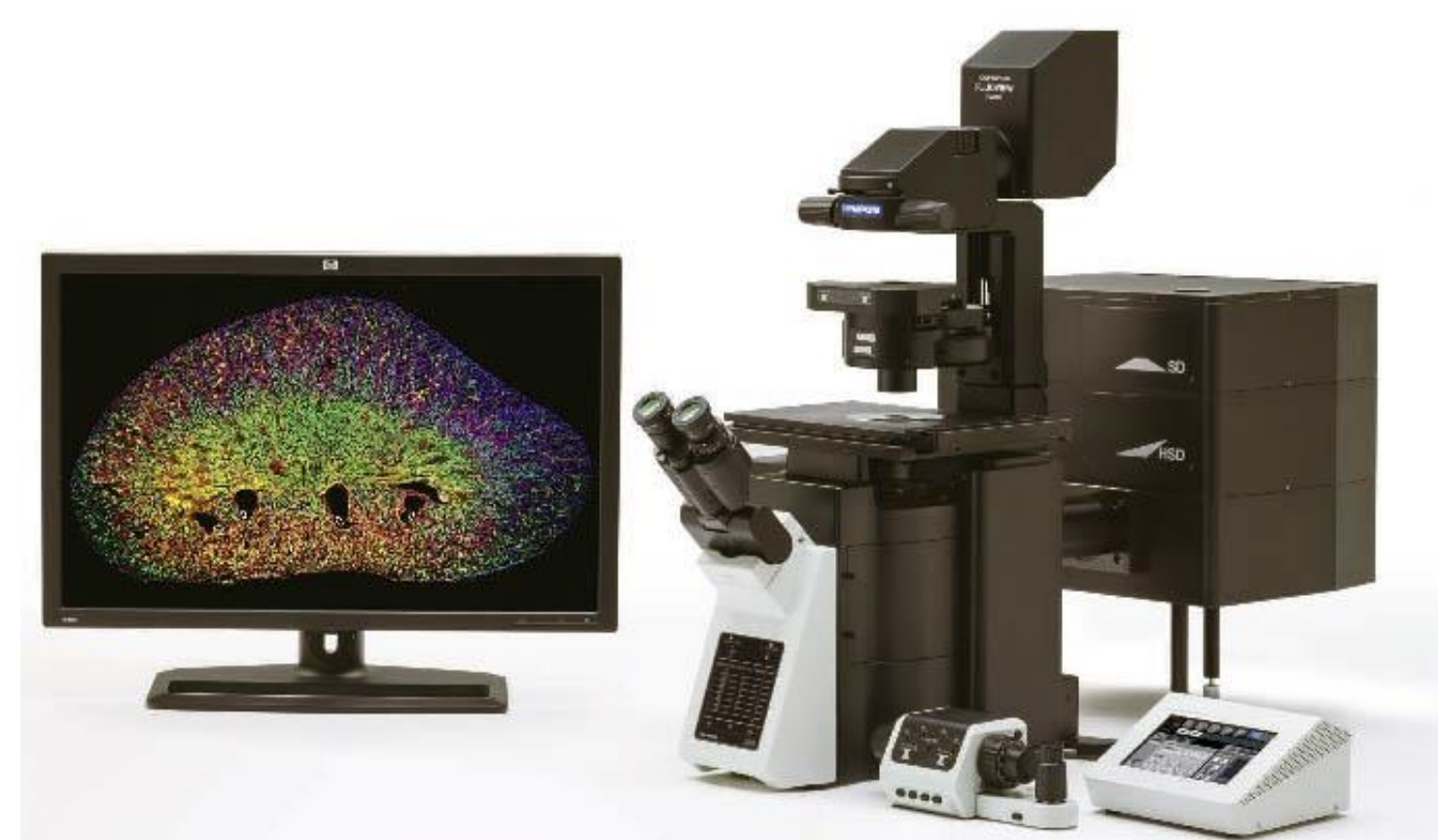
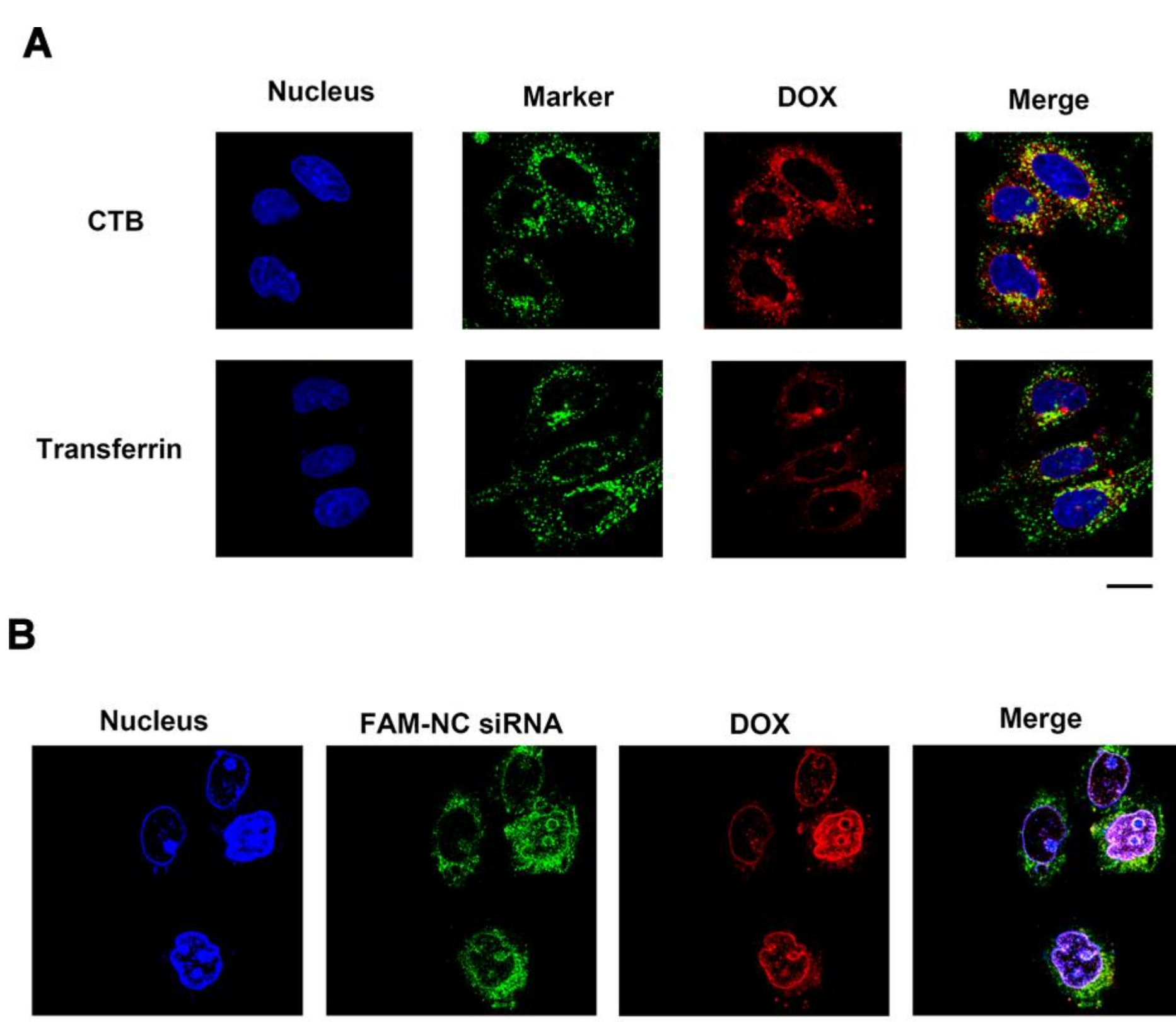
Fig. 6. Representative CLSM top-view and 3D structure images of biofilms formed on fouled control membrane (C0) and on fouled CdS/MIL-101 modified membrane (C2).

Biofilms are stained with SYTO9 (green), PI (red), and ConA (grey) for live cells, dead cells, and EPS (polysaccharides), respectively.

**Olympus FV3000激光
扫描共聚焦显微镜**

服务案例12---观察纳米粒的细胞递送

复旦大学印春华教授课题组于Carbohydrate Polymers杂志上发表题为“Co-delivery of doxorubicin and siRNA by all-trans retinoic acid conjugated chitosan-based nanocarriers for multiple synergistic antitumor efficacy”的文章(<https://doi.org/10.1016/j.carbpol.2022.119097>, IF=9.381)。印春华教授课题组为了实现多柔比星(DOX)和靶向B细胞淋巴瘤2 基因的小干扰RNA (siBcl-2)的共同递送,开发了乳糖酸(LA)和全反式维甲酸(ATRA)双接枝三甲基壳聚糖(TMC)纳米粒子(GTA NPs)。在研究过程中,利用国重平台的激光扫描共聚焦显微镜观察了GTA/DOX/siRNA NPs的高细胞摄取、摄取途径的机制及药物在细胞内的解离和分布。由于DOX、siBcl-2和GTA NPs的多重协同抗肿瘤作用, GTA/DOX/siRNANPs具有优于其他制剂的体外和体内抗肿瘤效率。



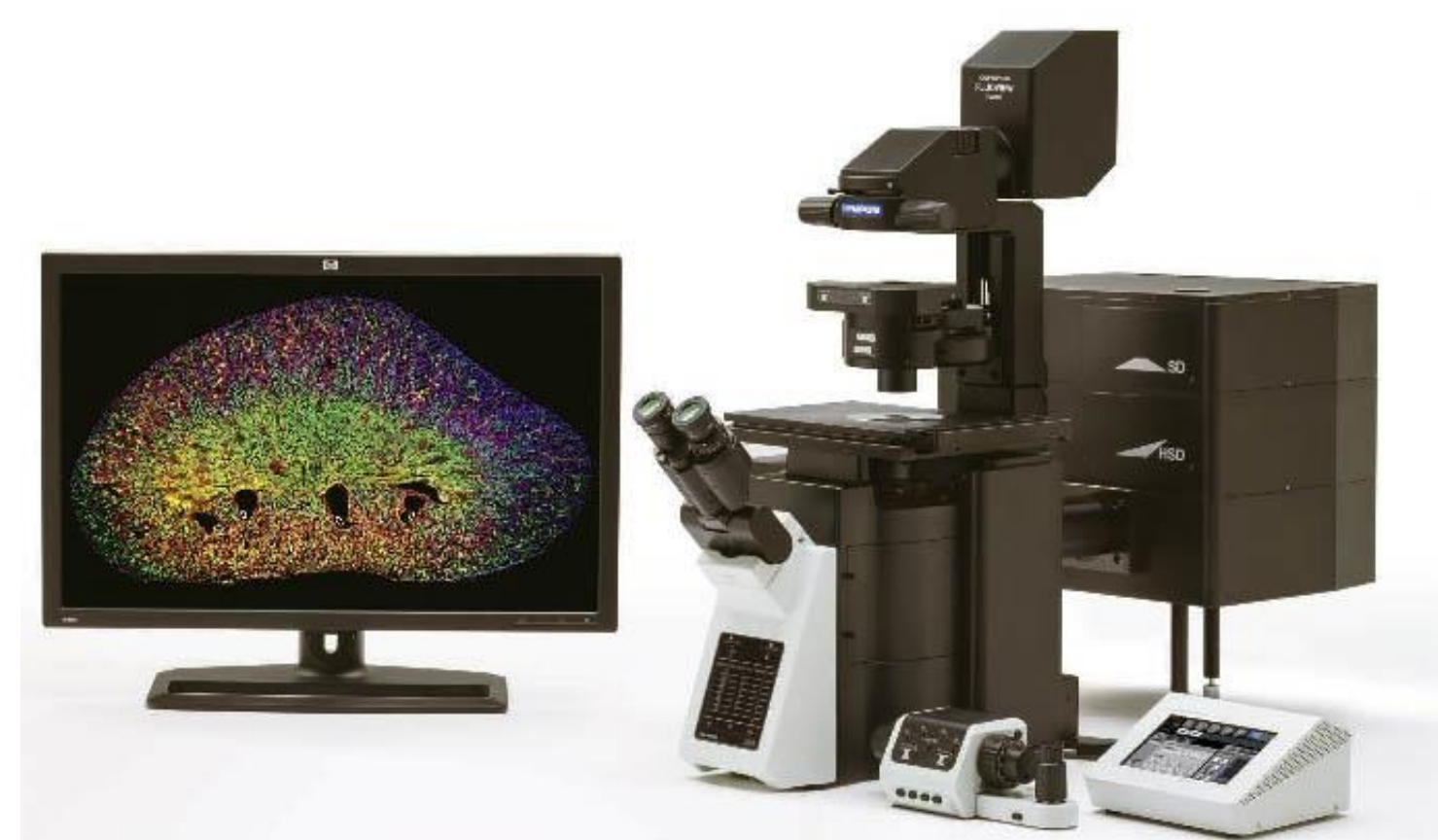
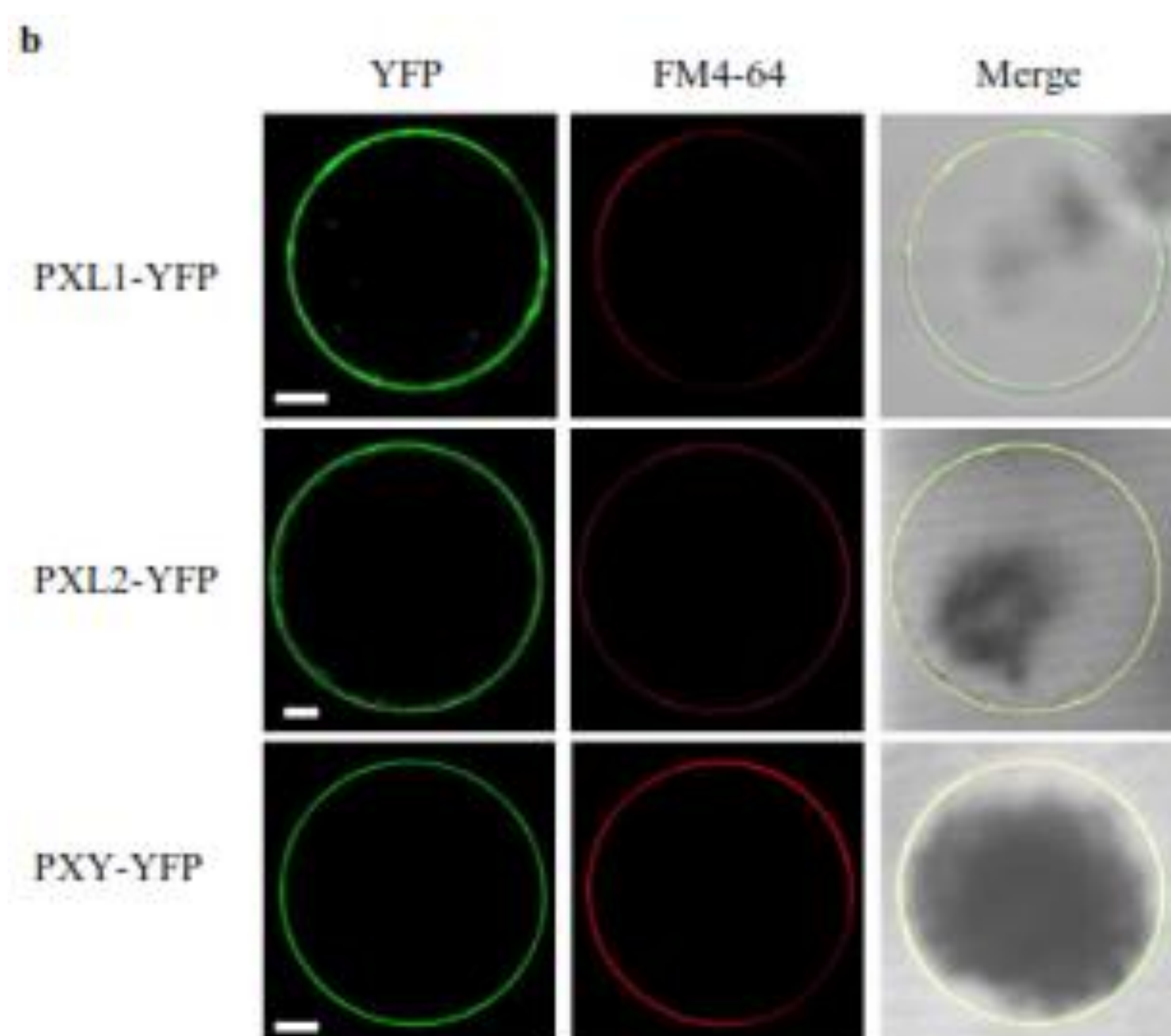
Olympus FV3000激光
扫描共聚焦显微镜

图A: 纳米粒与内吞标记物共定位;

图B: 纳米粒中siRNA和DOX的胞内分布。

服务案例13---受体激酶定位研究

复旦大学常芳教授课题组于Nature Communications杂志上发表题为 ‘ PXL1 and SERKs act as receptor-coreceptor complexes for the CLE19 peptide to regulate pollen development ’的文章 (Y. Yu et al., F. Chang, Nature Communications, 2023 <https://doi.org/10.1038/s41467-023-39074-4>)。在研究过程中，该课题组利用国重平台的超分辨激光共聚焦显微镜Olympus FV3000对拟南芥LRR-RLK家族的PXL1/2以及PXY蛋白进行亚细胞定位观察。课题组在烟草中叶片表皮细胞及原生质体两个表达体系中瞬时表达带有YFP标签的融合蛋白，激光共聚焦显微镜观察PXL1、PXL2及PXY均表现为细胞质膜特异性定位。此结果与文章中PXL1、PXL2及PXY做为膜受体接收胞外小肽激素信号而调控花粉发育相互支持，为进一步探究它们在花粉发育的功能奠定基础。

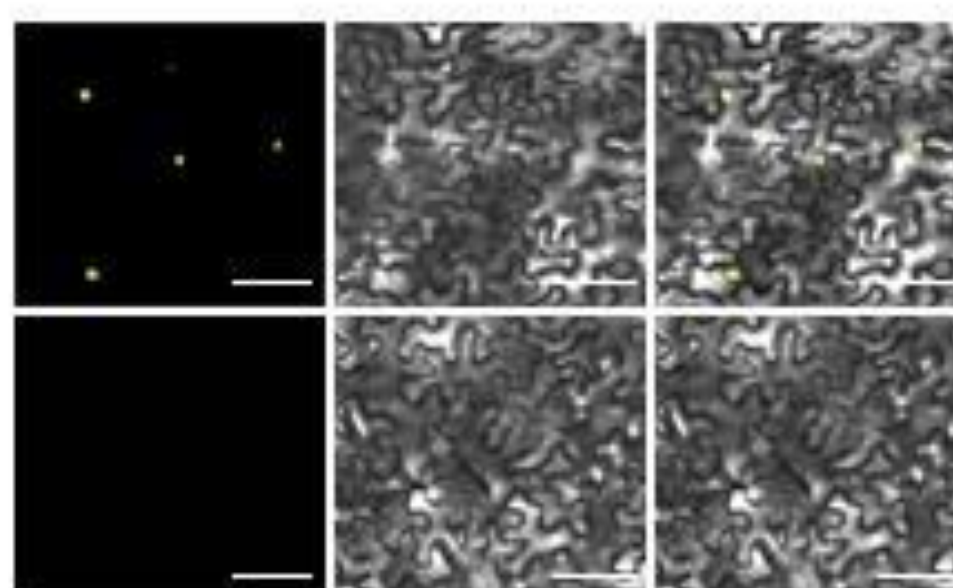
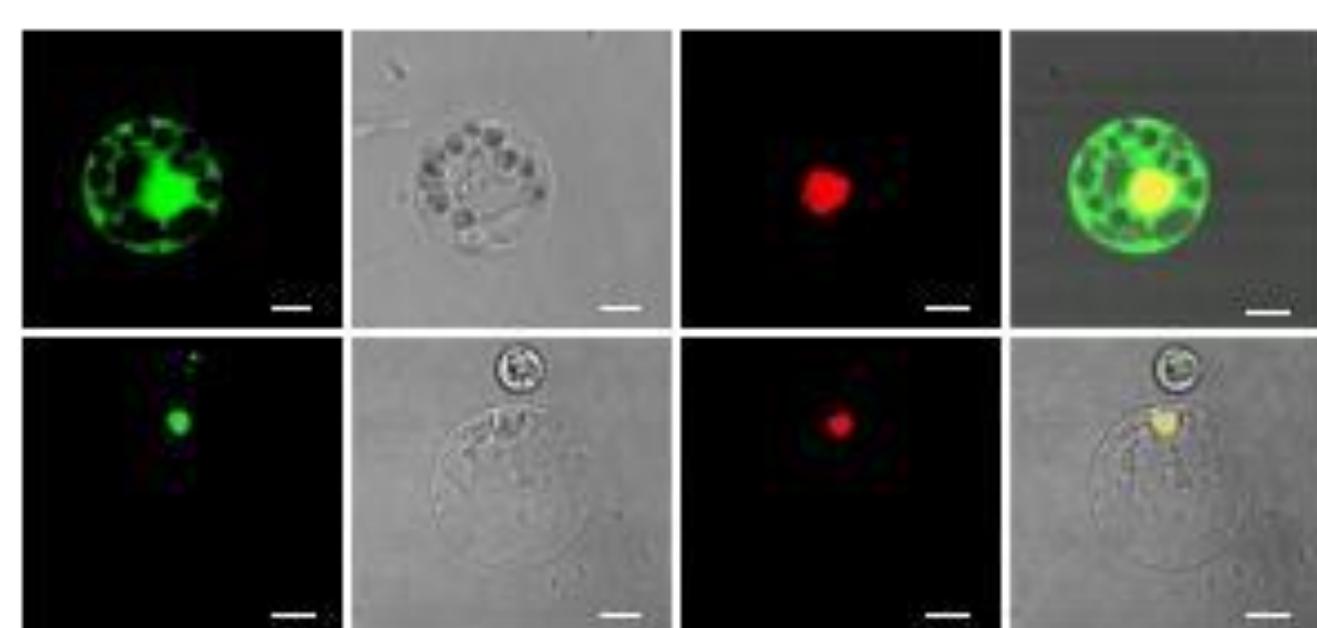
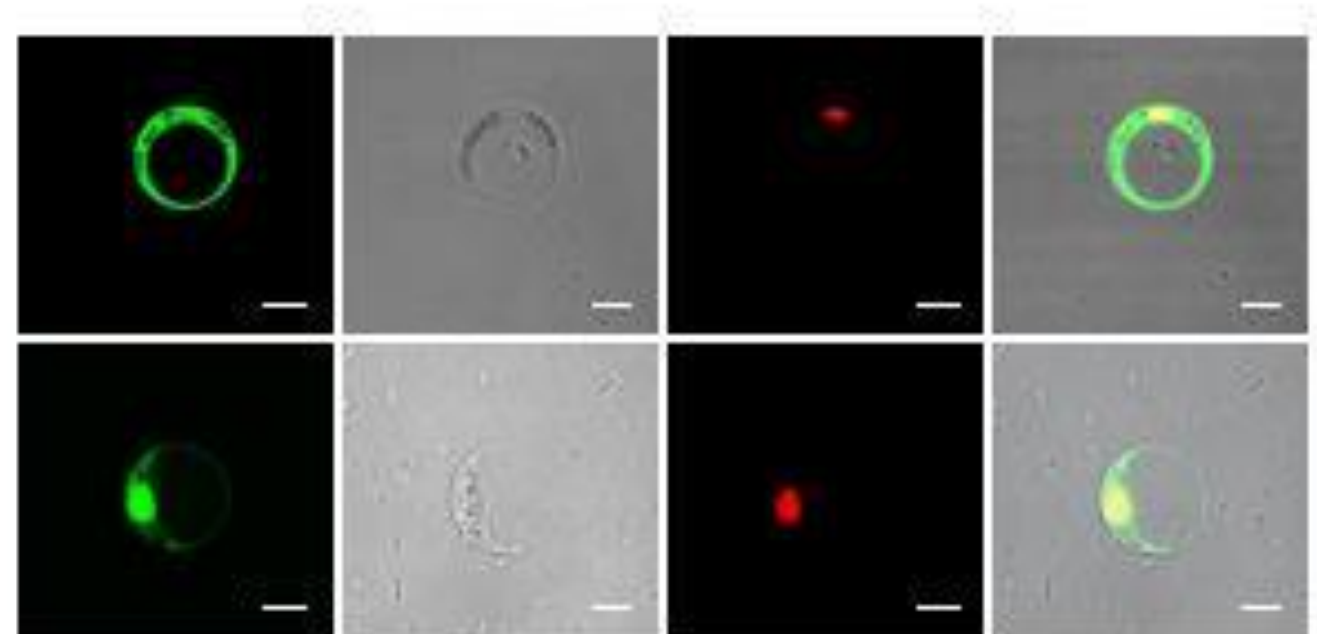


Olympus FV3000激光
扫描共聚焦显微镜

图b:PXL1-YFP, PXL2-YFP, PXY-YFP在烟草原生质体中的亚细胞定位。

服务案例14---亚细胞定位与蛋白互作验证

复旦大学罗小金教授课题组于Journal of Integrative Plant Biology 杂志上发表题为“Auxin signaling module OsSK41OsIAA10-OsARF regulates grain yield traits in rice”的研究论文(F. Ma et al. X. Luo, J. Integr. Plant. Biol., 2023, DOI:10.1111/jipb.13484)。该研究利用国重平台的Leica 共聚焦显微镜SP8在水稻原生质体中观察OsIAA10和OsTIR1的亚细胞定位，并探究了OsIAA10和OsTIR1在细胞核中的相互作用。在细胞内,不同的基因会在不同的位置发挥不同的作用,因此了解它们的亚细胞定位以及基因之间的相互作用发生的位置对于研究基因的功能非常重要，该仪器为阐述基因的作用机制提供了有力证据之一。



共聚焦显微镜
Leica TCS SP8

(A) Subcellular localization of OsIAA10 in rice protoplasts shown in scale bars of 20 μm ; (B) Subcellular localization of OsTIR1 in rice protoplasts shown in scale bars of 20 μm ; (C)Bimolecular fluorescence complementation assay confirmation of the interaction between OsTIR1 and OsIAA10 in the nucleus, shown in scale bars of 50 μm .

服务案例15---人肾上腺ZG细胞层的精确标记和获取

- 复旦大学胡长龙研究员课题组在Journal of Endocrinology 杂志上发表题为“L- and T-type calcium channels control aldosterone production from human adrenals”的文章（Tingting Yang et al. ,Journal of Endocrinology , (2020) 244,237–247.）在研究过程中，胡长龙研究员课题组利用国重平台的激光显微切割仪（Arcturus XT system, Life Technologies）和尼康正置激光扫描共聚焦显微镜，分别在mRNA水平和蛋白水平对人肾上腺皮质球状带（ZG）细胞中L型和T型钙离子通道的表达情况进行了探究。球状带细胞研究的困难之一是如何精确获取ZG细胞层（约20微米宽），在本案例中，研究者利用国重平台的激光显微切割仪，精确分离了满足实验需求的人ZG细胞，成功解决了这一难题，同时利用尼康正置激光扫描共聚焦显微镜清晰展示了ZG细胞的荧光标记。

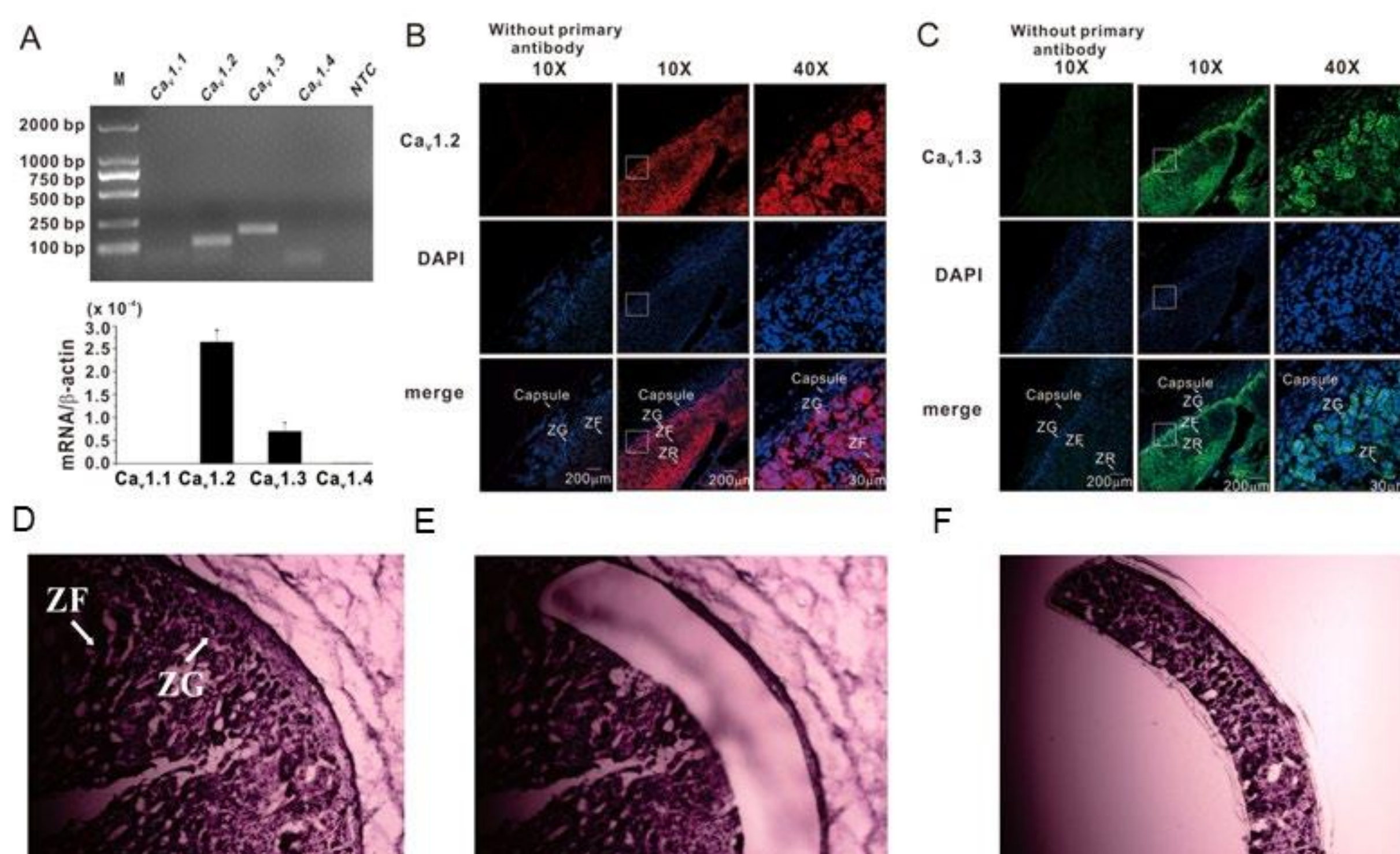
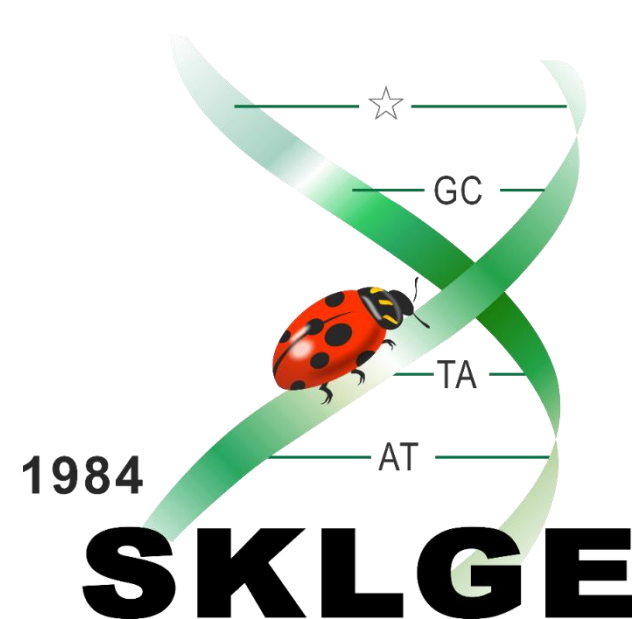


图1.人肾上腺皮质球状带细胞中，L型钙离子通道的表达;(A)L型钙通道mRNA水平表达情况；
(B-C) L型钙通道蛋白质水平表达情况；(D-F)利用LCM，获取人肾上腺切片中球状带细胞。



激光捕获显微切割系统



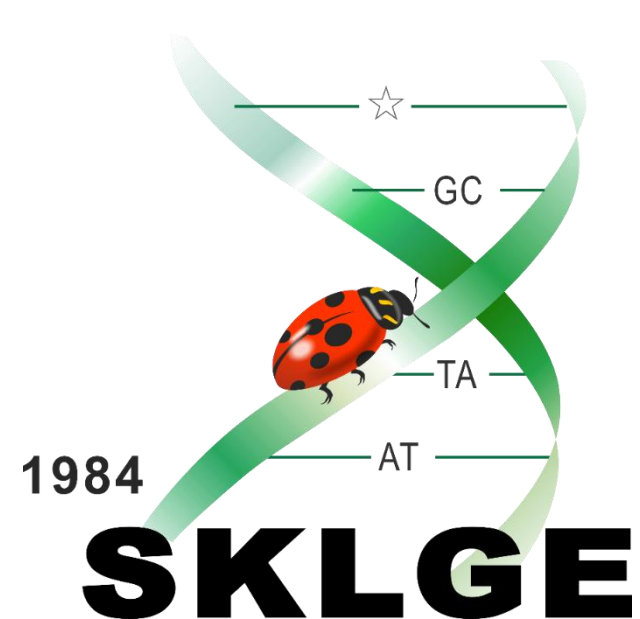
遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

近3年依托平台发表的SCI论文 (摘选)

- 1.Li Z, et al. LHP1-mediated epigenetic buffering of subgenome diversity and defense responses confers genome plasticity and adaptability in allopolyploid wheat. *Nat Commun.* 2023 Nov 20;14(1):7538.
- 2.Wang Y, et al. Coiled-coil domain-containing 38 is required for acrosome biogenesis and fibrous sheath assembly in mice. *J Genet Genomics.* 2023 Sep 13:S1673-8527(23)00186-8.
- 3.Deng T, et al. Structural mechanism of R2D2 and Loqs-PD synergistic modulation on DmDcr-2 oligomers. *Nat Commun.* 2023 Aug 26;14(1):5228.
- 4.Ma F, et al. Auxin signaling module OsSK41-OsIAA10-OsARF regulates grain yield traits in rice. *J Integr Plant Biol.* 2023 Jul;65(7):1753-1766.
- 5.Yu Y, et al. PXL1 and SERKs act as receptor-coreceptor complexes for the CLE19 peptide to regulate pollen development. *Nat Commun.* 2023 Jun 7;14(1):3307.
- 6.Buhe H, et al. IDO-1 inhibitor INCB24360 elicits distant metastasis of basal extruded cancer cells in pancreatic ductal adenocarcinoma. *Acta Pharmacol Sin.* 2023 Jun;44(6):1277-1289.
- 7.Qu H, et al. Cellulose nanocrystal as an enhancing core for antitumor polymeric micelles to overcome biological barriers. *Int J Biol Macromol.* 2023 May 31;238:124337.
- 8.Tian X, et al. Improved gene therapy for MFRP deficiency-mediated retinal degeneration by knocking down endogenous bicistronic Mfrp and Ctrp5 transcript. *Mol Ther Nucleic Acids.* 2023 May 9;32:843-856.
- 9.Gao K, et al. SPOP mutations promote tumor immune escape in endometrial cancer via the IRF1-PD-L1 axis. *Cell Death Differ.* 2023 Feb;30(2):475-487.
- 10.Song C et al. Construction of a pancreatic cancer nerve invasion system using brain and pancreatic cancer organoids. *J Tissue Eng.* 2023 Jan 6;14:20417314221147113.
- 11.Chen X, et al. Human striatal organoids derived from pluripotent stem cells recapitulate striatal development and compartments. *PLoS Biol.* 2022 Nov 17;20(11):e3001868.
- 12.Li X, et al. Ketamine impairs growth cone and synaptogenesis in human GABAergic projection neurons via GSK-3beta and HDAC6 signaling. *Mol Psychiatry.* 2022 Nov 21.
- 13.Wang C, et al. DNA polymerase epsilon interacts with SUVH2/9 to repress the expression of genes associated with meiotic DSB hotspot in Arabidopsis. *Proc Natl Acad Sci U S A.* 2022 Oct 11;119(41):e2208441119. doi: 10.1073/pnas.2208441119.
- 14.Liu Y, et al. Supramolecular Organic Frameworks as Adsorbents for Efficient Removal of Excess Bilirubin in Hemoperfusion. *ACS Appl Mater Interfaces.* 2022 Oct 26;14(42):47397-47408.
- 15.Chen Z, et al. Autism-Risk Gene *necab2* Regulates Psychomotor and Social Behavior as a Neuronal Modulator of mGluR1 Signaling. *Front Mol Neurosci.* 2022 Jul 13;15:901682.
- 16.Liu C, et al. Co-delivery of doxorubicin and siRNA by all-trans retinoic acid conjugated chitosan-based nanocarriers for multiple synergistic antitumor efficacy. *Carbohydr Polym.* 2022 May 1;283:119097.
- 17.Fang X, et al. IDO1 can impair NK cells function against non-small cell lung cancer by downregulation of NKG2D Ligand via ADAM10. *Pharmacol Res.* 2022 Mar;177:106132
- 18.Yan P, et al. A New RING Finger Protein, PLANT ARCHITECTURE and GRAIN NUMBER 1, Affects Plant Architecture and Grain Yield in Rice. *Int J Mol Sci.* 2022 Jan 13;23(2):824.
- 19.Liu F, et al. An excipient-free "sugar-coated bullet" for the targeted treatment of orthotopic hepatocellular carcinoma. *Chem Sci.* 2022. PMID: 36320701
- 20.Jiang T, et al. Dual targeted delivery of statins and nucleic acids by chitosan-based nanoparticles for enhanced antiatherosclerotic efficacy. *Biomaterials* 280 (2022) 121324



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

常见问题及建议

1. 本院学生使用平台显微镜需要培训吗？如何预约？

答：普通荧光显微镜可直接在平台网站上进行预约，而激光共聚焦显微镜则需要通过培训后获得预约权限。预约方式为网上（<http://lifesupporting.fudan.edu.cn>）预约。

2. 非本院人员如何使用平台显微镜？如何收费？

答：非本院人员可联系管理员老师(31246565)进行预约，收费标准和方式请咨询管理员老师。

3. 周末、节假日可以使用平台设备吗？

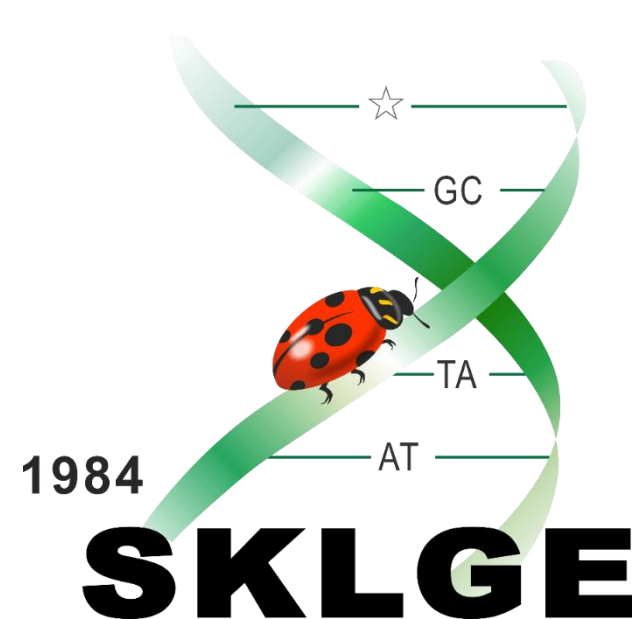
答：本院已获得预约权限并能独立熟练操作的同学在周末、节假日依然可以照常使用平台设备，其他人员请联系管理员老师。

4. 已预约的时间段可以修改或删除吗？不小心迟到、爽约了怎么办？

答：在未到预约时间前可在平台网站上进行修改或删除。预约开始半小时内未登录系统记为“迟到”，迟到用户无法登录系统，若需使用设备请联系管理员老师。未在预约时段登录系统记为“爽约”，同一帐户迟到、爽约达3次以上暂停预约资格。

5. 设备使用过程中遇到问题或故障怎么办？

答：工作时段遇到设备故障或操作问题请直接联系管理员老师（E101-4，31246565），其他时间则请在设备故障记录本上登记（注明日期、记录人、故障详情等），方便管理员老师及时处理。



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

常见问题及建议

6. 显微镜使用后怎么做？如何避免违规操作？

答：显微镜使用完毕后，首先做镜头清洁，特别是油镜，使用后请及时用擦镜纸蘸取无水乙醇进行清洁（最好把相邻镜头也作下清洁，防止使用过程中无意造成的污染）；然后将载物台降至最低，物镜调至低倍，再做台面清洁，最后退出帐号、依次关闭系统（若1小时内有其他同学预约，可仅退出帐号而不关闭系统）。通过培训但尚不能熟练使用设备的用户尽量预约在工作时段，以便管理员老师进行指导。

7. 成像数据如何转移？可以在平台保留备份吗？

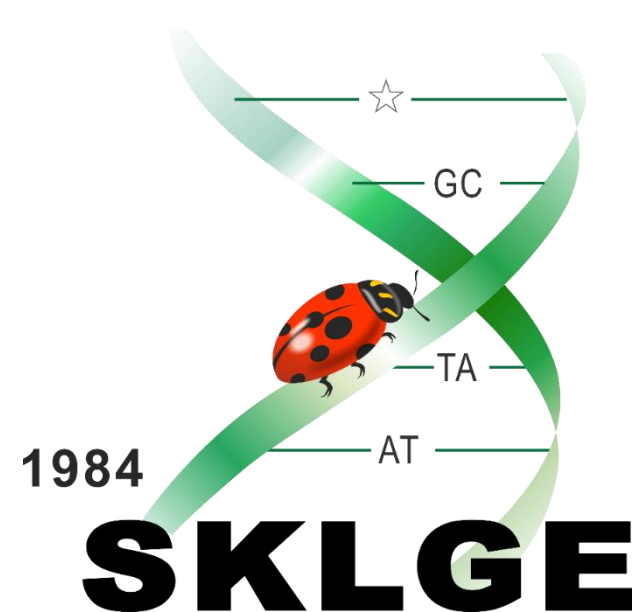
答：只能使用全新的光盘进行图像数据的复制与转移。每个课题组在设备工作站中只能有一个文件夹，课题组成员在该文件夹下建立个人文件夹。文件夹的命名方式为“课题组PI全名拼音”或“使用者全名拼音+学号”。建议个人数据在1个月内从设备工作站中转出，个人文件夹在设备工作站中的占用空间不超过1G。不符合命名方式、占用空间规定的数据将会被定期清理。

8. 如何选择适合的显微镜？

答：选择合适的显微镜首先要考虑的是样品的特点（比如样品大小、厚度、数量、固定样品还是活样品、运动速度、是否有荧光标记等等），此外，还要考虑所需分辨率的大小、设备的相关配置等等，如需详细了解请咨询管理员老师。

9. 发表文章时所使用设备单位的正式名称是什么？

答：如在文章致谢部分需要说明使用设备单位，名称写法建议如下“The Light Microscopy Facility at the State Key laboratory of Genetic Engineering Shared Facilities, Fudan University”



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

常见问题及建议

10. 平台有哪些图像处理软件？是否有免费的图像处理软件可供下载？

答：平台成像设备均配有相应的图像处理软件，如Zeiss Zen、NIS-Elements、cellSens、Leica LCS等，平台还提供专门的显微图像分析软件Bitplane Imaris，可满足多维图像的渲染及交互分析。另外一些常用的免费图像软件同学们可以直接从网上下载，比如：

①Zen （用于打开zeiss激光共聚焦显微镜--如平台的LSM710/880--拍摄的图像，图片格式.lsm 或.czi ）

<https://www.zeiss.com/microscopy/int/products/microscope-software/zen.html>

②Leica Application Suite X（适合徕卡显微镜使用的一种软件平台，用于打开、编辑和保存lif文件，并导出成各种文件格式，并有简单的分析处理功能）

<http://www.leica-microsystems.com/products/microscope-software/p/leica-las-x-ls/>

③NIS elements（适合尼康显微镜使用的一种软件平台，可打开、编辑和保存ND2文件，并导出成各种文件格式。）

<https://www.microscope.healthcare.nikon.com/products/software/nis-elements/viewer>

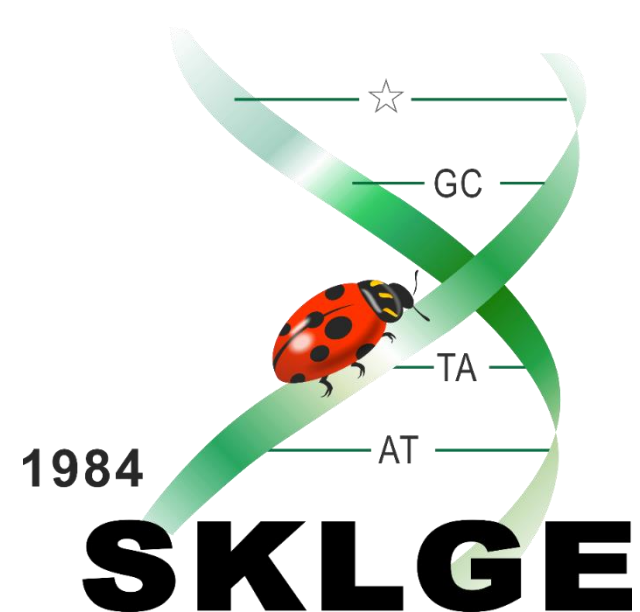
④Flouview viewer （用于打开Olympus激光共聚焦显微镜--例如平台的FV3000--的图片，图片格式.oib/.Oif）

<https://www.olympus-lifescience.com.cn/en/support/downloads/>

⑤ImageJ or FIJI （虽然免费但功能非常强大，可以打开并处理几乎所有图像文件）

<https://imagej.nih.gov/ij/download.html>

<https://fiji.sc/>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

常见问题及建议

11. ZEISS 宏观变倍体视显微镜 (AXIO Zoom V16) 只能保存为黑白图片或标尺保存不上时如何解决??

答：保存路径错误，不要在“file-save”中保存，需要按此途径保存：Processing→Method→Image Export→Parameters（设置保存位置、格式、文件名）→Input→Apply。

12. 尼康正置荧光显微镜 (Eclipse Ni) 出现“照相机驱动无法打开”时如何解决?

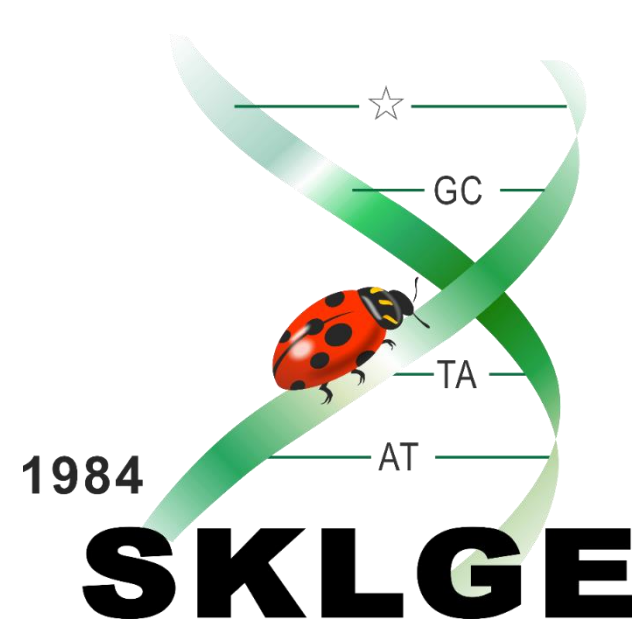
答：重启软件和软件与显微镜的连接器DS-U3，并确保连接器要先于软件开启。

13. Olympus 倒置荧光显微镜 (IX73) 拍摄图像背景有很多黑点、无法切换荧光通道，比例尺不准时如何解决?

答：这些问题一般是由于CB5S没有打开，所以软件没有连接上，虽然软件可以正常预览、拍照，但是会出现一些问题，只要重新打开CB5S即可。

14. ZEISS 超分辨共聚焦显微镜 (LSM880 with Airyscan) 使用油镜时找不到焦距如何解决?

答：检查样品架是否放平，物镜是否到位，光源有无问题，物镜上是否有镜油，样品是否正确放置、是否使用共聚焦适用器皿。方法建议：先肉眼检查样品是否在合适的视野（如果细胞密度不大，建议先在低倍镜下找到视野），选择容易观察到样品的通道，把物镜调到最低位置，通过调节细准焦螺旋慢慢找到焦平面。



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering

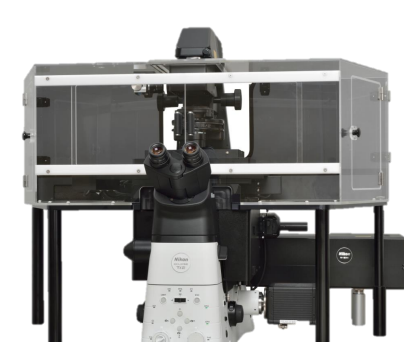


复旦大学生命科学学院
School of Life Science Fudan University

Introduction

The Light Microscope Facility houses state-of-the-art equipment including Super-resolution imaging systems, Multi Photon microscope, Light-sheet microscope, High-speed spinning disk confocal imaging platforms, Laser scanning confocal microscopes, High content imaging and analysis systems, Wide-field fluorescence microscopes, Stereo Zoom microscope, High-throughput platform for plant imaging, Laser capture microdissection system, independent imaging visualization, detection and analyzation workstation etc. These equipment provide powerful resources for imaging model organisms, tissue, cells, and biomaterials. The Light Microscopy Facility provides microscopic imaging services to the research groups campus-wide 24 hours per day, 7 days per week and accepts samples from off-campus academic and industrial partners too. Services include technical support, consultation for instruments selection, experiments planning, training, equipment problems troubleshooting and data interpreting etc. In general, imaging of fixed samples, cultured cells, organ slices, small animals and plants can be accommodated.

Instruments



N-SIM



SP8 DIVE FALCON



ZEISS LSM880



Andor Dragonfly202



Olympus SpinSR



UltraMicroscope II



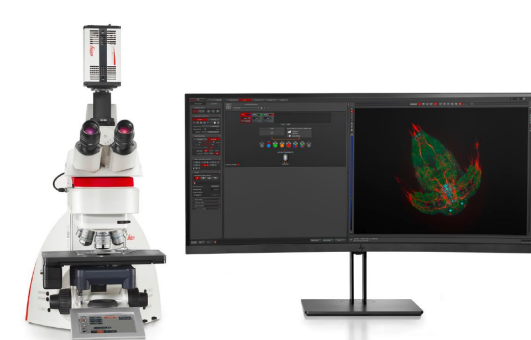
Operetta CLS / Opera Phenix



Leica STELLARIS



Olympus FV3000



Leica THUNDER



Nikon A1



Leica SP8



ZEISS LSM710



ArcturusXT™ LCM



Olympus IX71



Olympus IX73



ZEISS AXIO Zoom V16



Nikon Eclipse Ni



MAXI-IMAGING-PAM



Berthold NightSHADE LB985



DynaPlant® High-throughput Platform



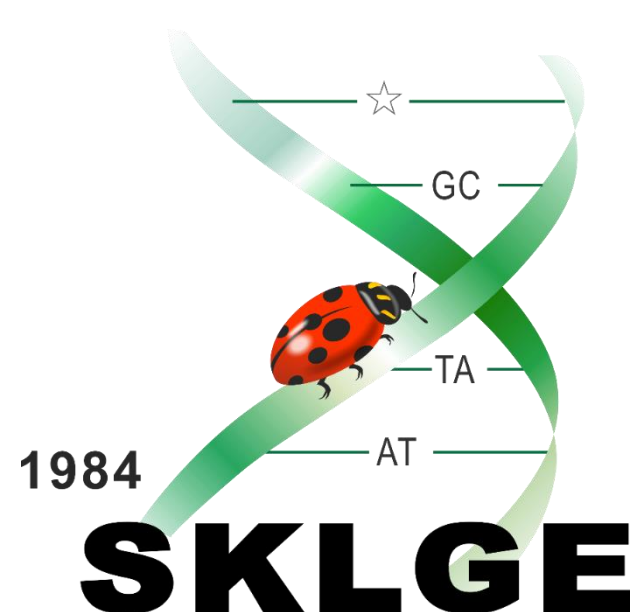
Phenotyping Gantry Entoscan

Imaging techniques

- ◆ High-resolution imaging of fixed or living specimens
- ◆ Two-photon imaging of thick samples
- ◆ Time series imaging of living cells
- ◆ Super-resolution Structured Illumination Microscopy (SIM) imaging
- ◆ Optical slice imaging and 3D reconstruction
- ◆ Whole slide imaging
- ◆ Specialized microscopy techniques (FRAP, FRET, FLIP, FLIM...) and intracellular Ca(2+) concentration measurement
- ◆ Transmitted-light imaging (phase, DIC, etc)
- ◆ Total Internal Reflection Fluorescence (TIRF) imaging
- ◆ High-content screening (Confocal and Wide-field)
- ◆ Laser microdissection of tissue and single cells capturing

Personnel and Contact Information

Contact: Jiange Yang Dan Shi Genfeng Zhu Office: E101-4 Tel: 021-31246565



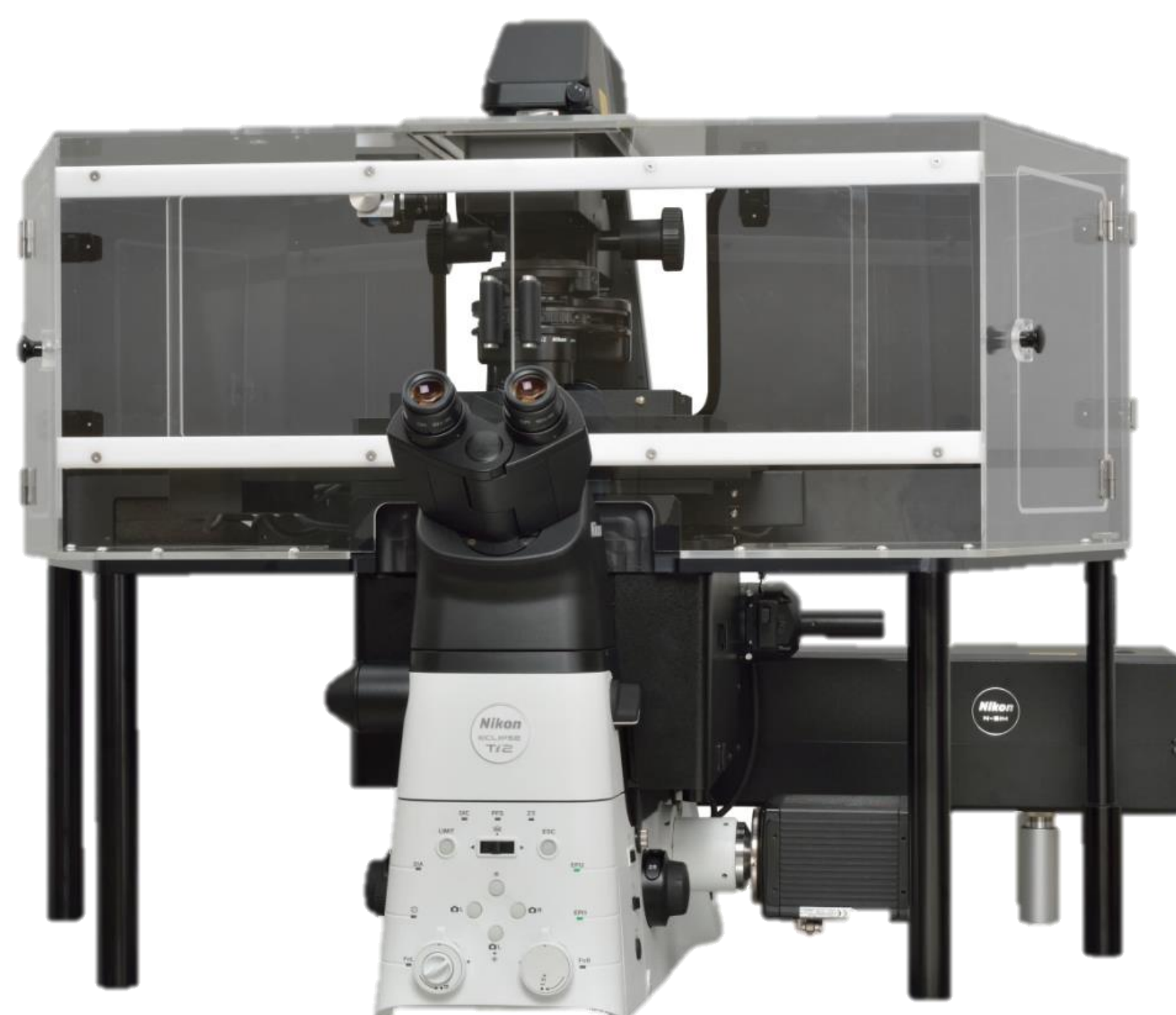
遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

N-SIM S Super-Resolution Imaging System

N-SIM S, based on the principle of structured illumination and high-quality objective with a high NA (1.49), extends the resolution of conventional optical microscope twice, and meanwhile, achieves a high frame rate of 15fps with novel high-speed illumination modulation strategy, contributing to the analysis of dynamic process in tiny samples. Three included super-resolution imaging modes (TIRF-SIM/2D-SIM/3D-SIM) are suitable for observing superficial membrane structure, real-time acquisition of live samples and analysis of thick samples, respectively and in addition, can switch to one another seamlessly, beneficial for the easy operation procedure. Application range is as follows: interaction among different organelles, structural changes of cytoskeletal protein, mitosis and meiosis, morphological investigation of dendrite spine of neuron, endocytosis of cytomembrane, the development of fluorescent probes, mechanism research of autophagy, yeast's vesical, approach of virus infection, plant vacuoles, structural analysis of nanomaterials, rapid dynamic tracking and so on.



Location: E101-1 Contact: Youheng Wei /Dan shi Tel: 31246565

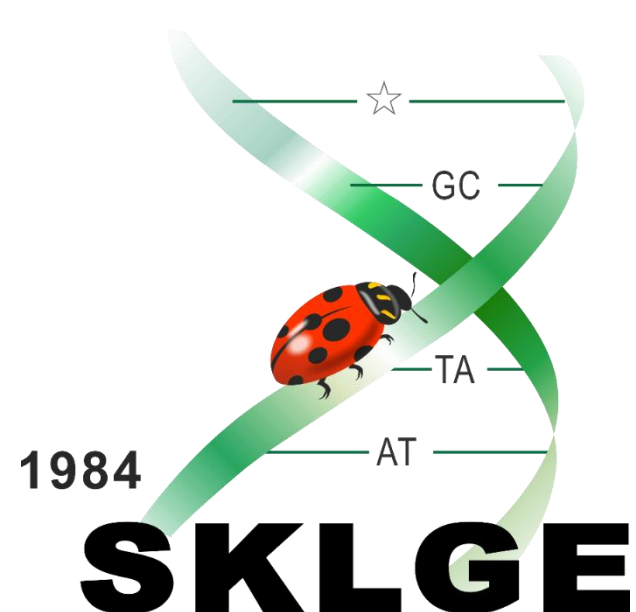
Configuration:

- 1.Imaging mode: widefield, TIRF-SIM/2D-SIM/3D-SIM for super-resolution imaging
- 2.Four lasers: 405nm, 488nm, 561nm, 647nm for conventional dye excitation (DAPI/FITC/TRITC/Cy5)
- 3.Objective : 10X, 40X, 100x (Oil), 60x (water)
- 4.Piezo stage for rapid and accurate Z movement
- 5.Camera: Hamamatsu flash 4.0 V3
- 6.Chamber and slide compatible
- 7.NIS-Elements control and data analysis software; high performance workstation

Application:

1. Image reconstruction and post-processing for obtaining a super-resolution image with high contrast and low noise
2. Manual and auto threshold methods, producing simple and complicated binary for cell count, structure segmentation, area statistics
3. Colocalization analysis for judging the interaction among different structures
4. Intensity comparison in ROI (Region of Interest) for observing the effect of biological treatment

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

Leica SP8 DIVE Multiphoton with FALCON FLIM

Leica TCS SP8 DIVE FALCON, based on the Leica TCS SP8 confocal imaging platform, is a cutting-edge imaging system with the capability of confocal imaging、multi-photon imaging and FLIM (Fluorescence Lifetime Imaging Microscopy) imaging, which is spectrum-freedom and the most flexible. The confocal module can achieve 120nm lateral resolution with Leica patented HyDTM detectors, linear scanning and Lightning technology; with the resonant scanner, 28fps can be achieved at 512*512 scanning resolution. Multiphoton module is spectrum-freedom and super-sensitive in the whole visible-light detection range(380nm-800nm), with the world's first spectral NDD detectors; equipped with the 1300nm IR laser, the system can do two-photon、three-photon、SHG and THG imaging. FALCON module can extract fluorescence lifetime information in fixed or live samples with the high-speed counting rate (300MCPS), which will lead to a new imaging dimension in scientific research.



Location: E101-3 Contact: Genfeng Zhu Tel: 31246643

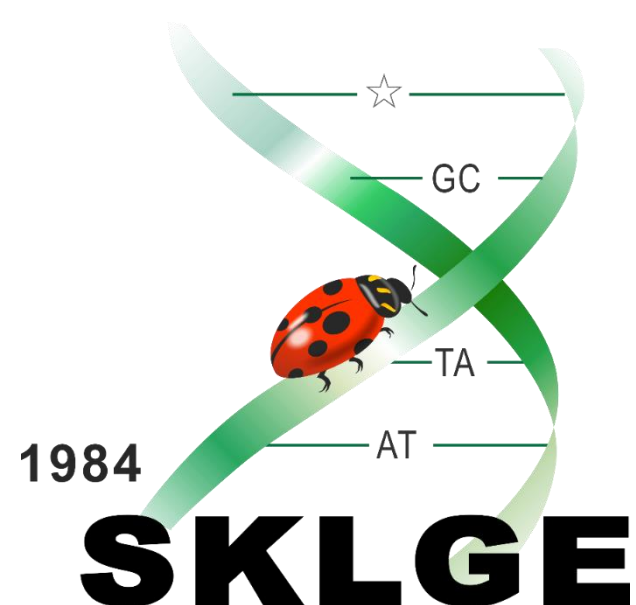
Technical parameters:

1. Two high-sensitive spectral HyD-RLD detectors, detection range 380-800nm, minimum step size 1nm; two internal spectral detectors, minimum step size 1nm.
2. IR lasers: tunable 680-1300nm, fixed 1045nm; Visible light lasers: 405/458/488/514/561/633nm.
3. FALCON: 300MCPS photon counting rate.
4. Lightning: lateral resolution <120nm.
5. Resonant scanner: 28fps@512X512.
6. Objectives:10x, 20x, 40x, 40x(Water), 63x(Water).

Applications:

1. Confocal imaging.
2. Multiphoton fluorescence imaging: for tissues and animals (penetration depth 1mm), imaging with photo-manipulation.
3. SHG/THG: label-free imaging for collagen, muscle, and blood vessels.
4. FLIM: auto-fluorescence lifetime, metabolic status (NADH/FAD) and live cell fluorescence lifetime(Ca²⁺).
5. Lightning: co-localization and subcellular structure imaging.
6. High speed imaging.
7. FRAP, FLIM-FRET, co-localization, tile-scan.
8. Live cell imaging.

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

Super Resolution Confocal Microscope Zeiss LSM880 with Airyscan

The unique Airyscan super resolution detector, with fast ultra-high resolution imaging and highly sensitive image acquisition, can obtain horizontal resolution of 120nm and axial resolution of 350nm in high resolution mode, and can improve the SNR by 4-8 times. LSM880 is capable of imaging samples with low damage by linear scanning and detector in high sensitivity. The position of the scanner can be continuously monitored and calibrated during the scan to ensure a stable viewing field and the same residence time for each pixel throughout the viewing field. Images are captured at up to 13fps at 512*512 resolution.



Location: E101-13

Contact : Dan Shi

Tel: 31246565

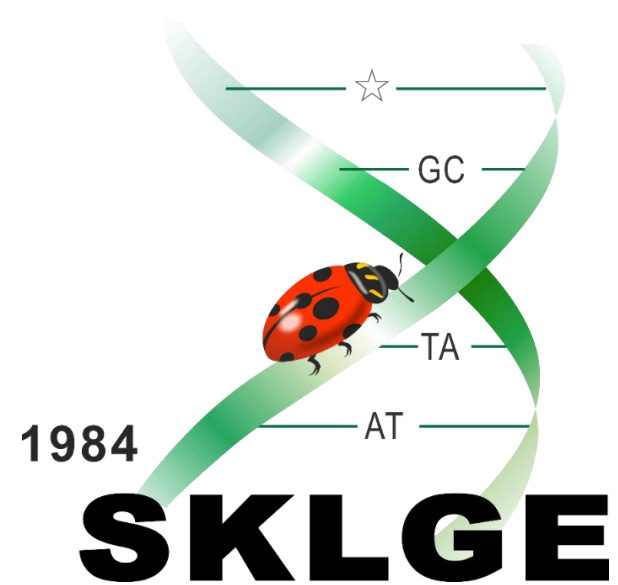
Specification and configuration:

1. Inverted microscope, using a 0.17mm cover slide or a culture dish with a glassy bottom of 0.17mm
2. Equipped with 405,488,561,633 laser tubes, it can excite 405,454,488,514,561,633 emission spectra
3. Objective lens: 5x, 10x, 20x, 40x, 40x (water lens), 63x (oil lens), 63x (glycerine lens)

Functional application:

1. Localization of fluorescence signal
2. Morphology imaging
3. 3D image construction
4. Time series imaging
5. Equipped with 32-channel GASP detector, with real-time spectral splitting function
6. FRAP, fluorescence bleaching experiment
7. FRET, resonance transfer of energy
8. Calcium wave imaging
9. Wide-field image splice
10. High resolution imaging. The horizontal resolution of 120nm and axial resolution of 350nm can be obtained in high resolution mode

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

Andor Dragonfly High-speed Spinning Disk Confocal Imaging Platform

Dragonfly is a high-speed confocal imaging platform supporting multiple high-contrast imaging techniques which is designed to provide fast and sharp imaging of wide range of specimens ranging from bacteria to single molecules at the cell membrane, embryos, organoids and fixed and acute tissue sections. At the heart of the platform is a newly designed microlens confocal scanner, tightly integrated with the highest sensitivity cameras and presented via the new imaging software, Fusion. The result is speeds of 10 to 20 times faster than a traditional confocal. Dragonfly is a highly productive imaging platform which provides superior spatial and temporal resolution. Confocal illumination by hundreds of microbeams minimizes photobleaching and protects from phototoxicity, essential for successful live cell experiments.



Location: E101-12

Contact : Jiange Yang

Tel: 31246565

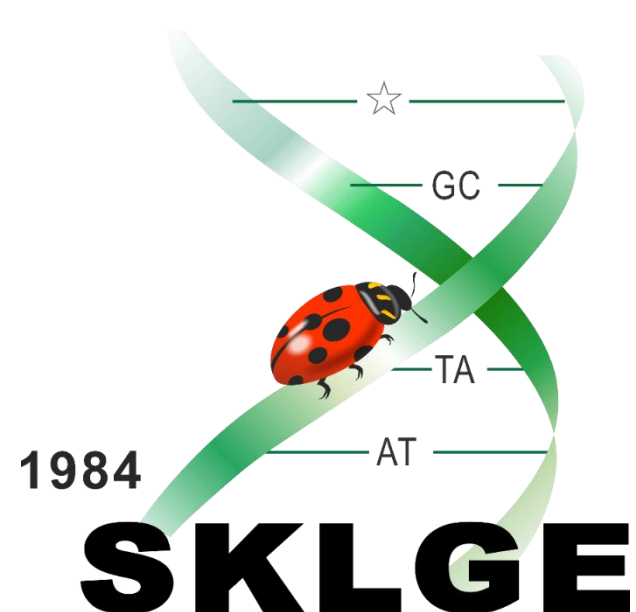
Technical Parameters:

1. Automatic Inverted microscope with 4x, 10x, 20x, 40x (oil), 60x (oil), 100x (oil), 150x (oil)
2. laser: 405nm, 488nm, 561nm, 637nm
3. Two Cameras: Back-illuminated sCMOS Sona 4.2B-11
4. Living cell workstation
5. Andor mosaic3 DMD photo-stimulation system

Applications:

1. Time-lapse Confocal fluorescence imaging
2. XYZ 3D Confocal fluorescence imaging
3. XYZt living cell confocal fluorescence imaging with multi-field
4. XYZtl 5D confocal fluorescence imaging
5. Multi field montage: tissue, organoid and model organism
6. Simultaneous two channels confocal fluorescence imaging
7. FRAP & FRET
8. Optogenetics

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

Super-Resolution Spinning Disk Confocal System Olympus/Evident SpinSR

The Olympus/Evident super-resolution spinning disk confocal system achieves fast, multi-dimensional, and super-resolution imaging by adopting a CSU-W1 scanning unit structure different from conventional point-scanning confocal microscopy. The system minimizes sample phototoxicity and photobleaching, thereby is capable of maintaining cells in long-term viable state. The system meets the needs of conventional confocal scanning imaging and large-field stitching imaging of sectioned tissues, as well as highly resolved and super-resolution 3D imaging in deep layer of thick tissues. The simultaneous imaging with dual cameras enables fast dynamic fluorescence signal ratio-metric imaging. Paired with the hardware autofocus of zero-drift compensation, the system realizes long-term real-time observation and imaging of intracellular organelles such as the structures of cytoskeleton, nucleus or autophagosome membrane, and other subcellular structures, as well as the high-speed and high-resolution multichannel fluorescence imaging of organoid 3D structure. Combined with a unique TruSight deconvolution module, the system can achieve super-resolution imaging of varieties of samples at a spatial resolution less than 120 nm.



Location: E101-13

Contact : Jiange Yang

Tel: 31246565

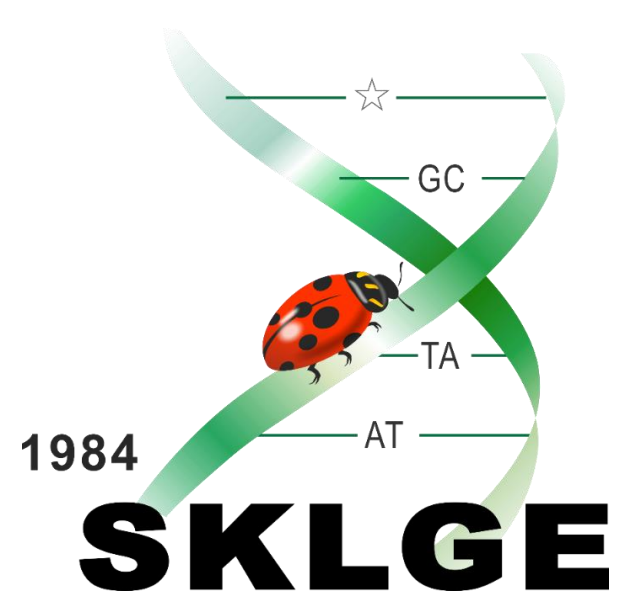
Technical Parameters:

1. 5 laser wavelengths: 405/488/561/594/640 nm
2. Two high-sensitivity sCMOS cameras: high quantum efficiency (95%), low readout noise (0.6e), full-frame resolution 2304 x 2304 pixels acquired at 89 fps
3. Hardware super-resolution technology, with real-time spatial resolution less than 120 nm
4. Hardware zero-drift compensation system
5. Built-in live cell cultivation component
6. Piezoelectric Z focus, enabling fast 3-D imaging
7. FRET real-time analysis module
8. Objectives: 10X, 20X, 40X high-resolution plan objectives, 20X long working distance high-resolution objective, 60X high-resolution oil-immersion objective, 150X super-resolution oil-immersion objective

Applications:

1. Conventional multichannel confocal fluorescence imaging
2. Conventional scanning of fluorescently labelled tissue sections, and large-field tissue image stitching
3. Multi-channel, multi-dimensional long-term live cell imaging
4. Rapid 3D imaging of organoids or thick tissues
5. Super-resolution imaging of live cell structures and molecules
6. FRET fluorescence signal ratiometric analysis
7. High-speed dynamic imaging of intracellular molecules

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

UltraMicroscope II Light Sheet Imaging System

The UltraMicroscope II Light Sheet Microscope allows for faster, high-resolution 3D scanning imaging of large volume biological samples, such as rodent organs, embryos and more. The UltraMicroscope II light sheet microscope utilizes a pairwise orthogonal light path that confines light to a single plane, allowing researchers to gain insight more quickly into the biological structure of large volume samples, and providing a new tool for studying biological systems and physiological processes from a holistic perspective. The UltraMicroscope II light sheet microscope has flexible and adjustable light sheet parameters, so when examining different samples, different parameter settings can be easily selected through the software to achieve the best imaging results. When imaging small samples, high aperture (High NA) illumination is usually chosen to obtain better Zaxis resolution. Low NA illumination is selected for large field observations of large samples. The UltraMicroscope II uses a bi-directional triple beam to uniformly illuminate the sample from different angles, ensuring that dark areas and projection bands are minimized. The instrument is compatible with all existing transparency methods and automatically adjusts and compensates for optimal imaging results.



Location: E101-12

Contact : Dan Shi

Tel: 31246565

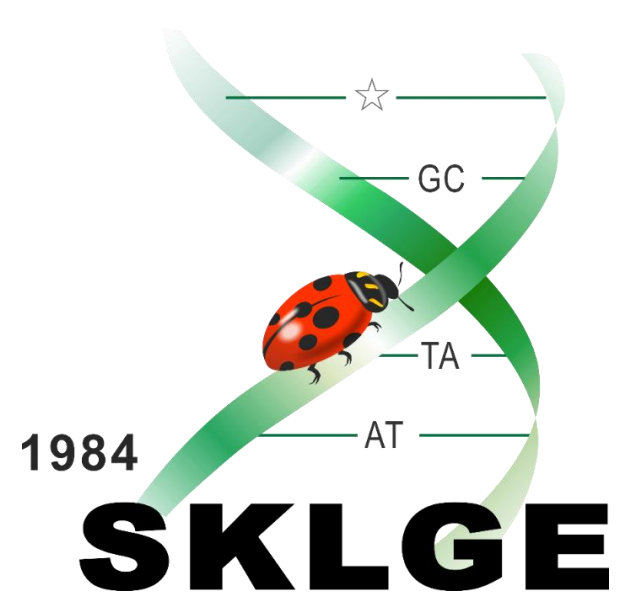
Technical Parameters:

- 1、 White light laser, wavelength range 405-850 nm
- 2、 Six beams on both sides, sheet thickness 4 μm -24 μm , sheet width 1 mm-20 mm
- 3、 Refractive index matching range 1.33-1.56
- 4、 Sample travel range (X, Y, Z) of 1 cm*1 cm*1cm
- 5、 objective lenses : 1X、 4X、 12X MI Plan

Applications:

- 1、 Complete three-dimensional fluorescence imaging of various tissues and organs
- 2、 Screening and validation of drug targets in model animals
- 3、 Identification and spatial distribution imaging of various cell types in tissues
- 4、 Three-dimensional imaging of neuronal distribution and orientation
- 5、 Three-dimensional fluorescence imaging of blood vessel distribution

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

High Content Imaging and Analysis System Operetta CLS

Operetta CLS system combines speed and sensitivity with the powerful and intuitive data analysis. It delivers everything biologists need from high-content analysis – and more: Water-immersion objectives that capture more light than air objectives for exceptional image data quality. A more stable LED light source with up to eight excitation wavelengths for flexible staining and labeling, and more power for better results with less background noise. Confocal and widefield imaging that enable researchers to select the right imaging technology to match their application. And a highly sensitive sCMOS camera that provides a large field of view and high-resolution image capture. The Harmony® high-content imaging and analysis software is easy-to-learn and easy-to-use which empowers users to do their own analysis.



Location: E101-12

Contact : Dan Shi

Tel: 31246565

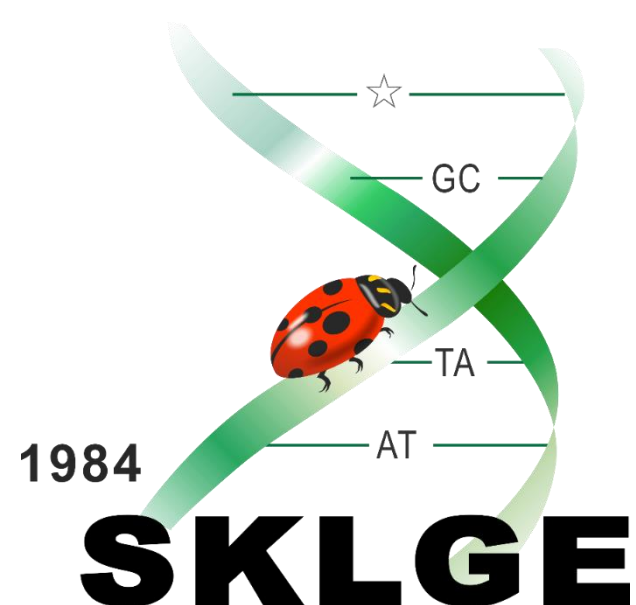
Technical Parameters:

1. Fully integrated and automated imaging system, Widefield and Confocal, wide view Nipkow spinning disk.
2. Eight LEDs : 365nm, 405nm, 440nm, 475nm, 510nm, 550nm, 630nm, 660nm
3. 740nm LED Transmitted light
4. Objective : 5x, 10x, 20x, 40x
5. Environment control
6. 6-1536 plate compatible, Slide imaging adaptor.
7. Harmony control and data analysis software; high performance workstation

Applications:

1. Ready-made turnkey applications, include at least 32 solutions. Easy and intuitive creation and modification of analysis sequences
2. Texture analysis capabilities
3. PhenoLOGIC™ machine learning plug-in available, enabling users to teach the software to create tailored algorithms
4. STAR analysis function
5. Automatic or manual parameter tuning

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



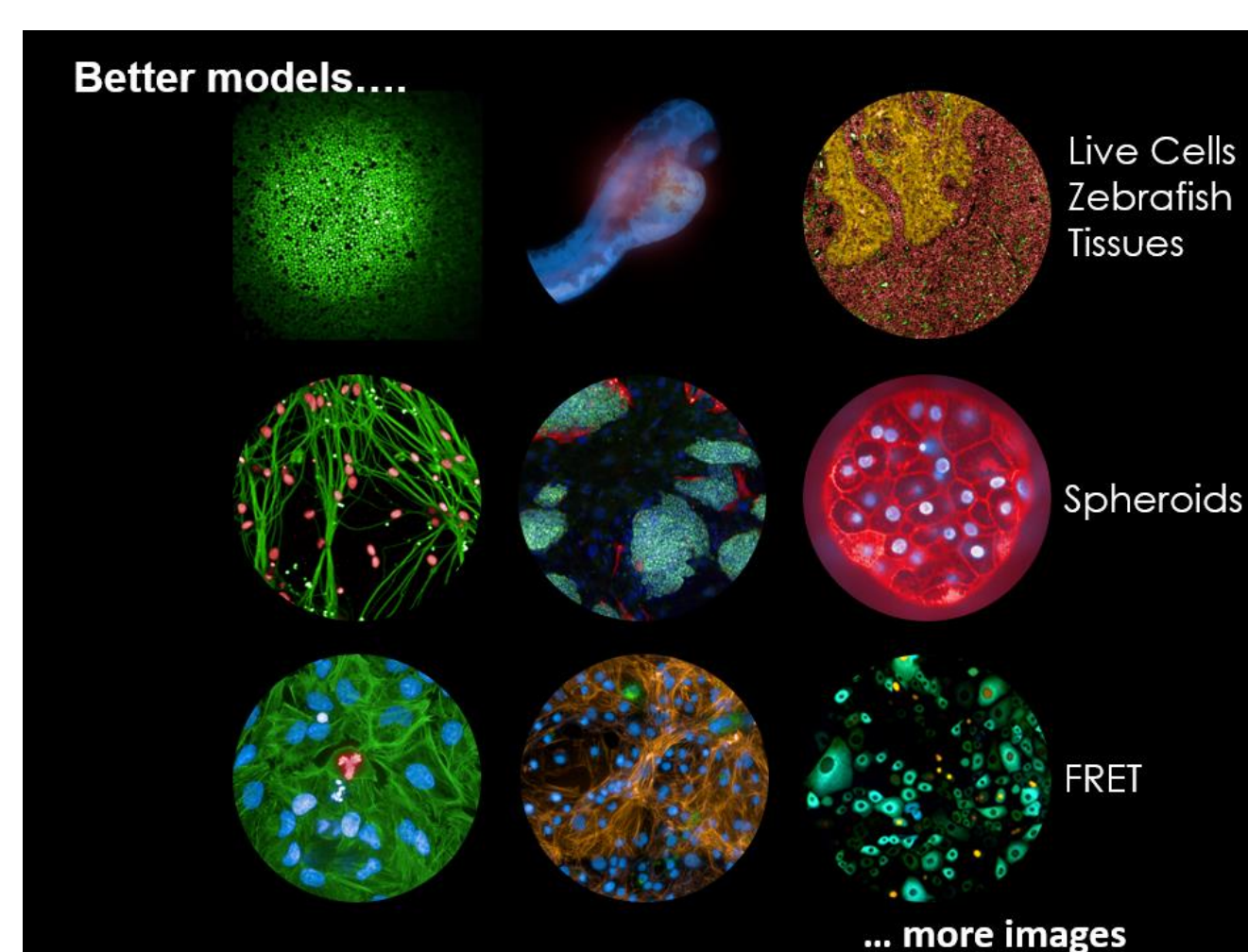
遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

PerkinElmer Opera Phenix High Content Imaging and Analysis System

PerkinElmer Opera Phenix High Content Imaging and Analysis System is next-generation, top-of-the-line imaging system. The Opera Phenix has a unique lightpath and advanced optics that can take your high content imaging applications to a new level. With Opera Phenix, we're delivering our Drawing on more than a decade of experience in HCS applications, it's simultaneous multicolor confocal image acquisition delivers speed without compromising sensitivity, because spectral crosstalk is reduced to a minimum. Making it the ideal high content screening system for discriminating phenotypes and studying complex disease models, such as primary cells and microtissues. The Opera Phenix can really benefit from phenotypic screening approaches and complex cellular models, because it is with more sensitivity to capture more information and the speed to image numerous cells under varying conditions and measure multiple parameters.



Location: G108

Contact: Jin Li

Tel: 31246592

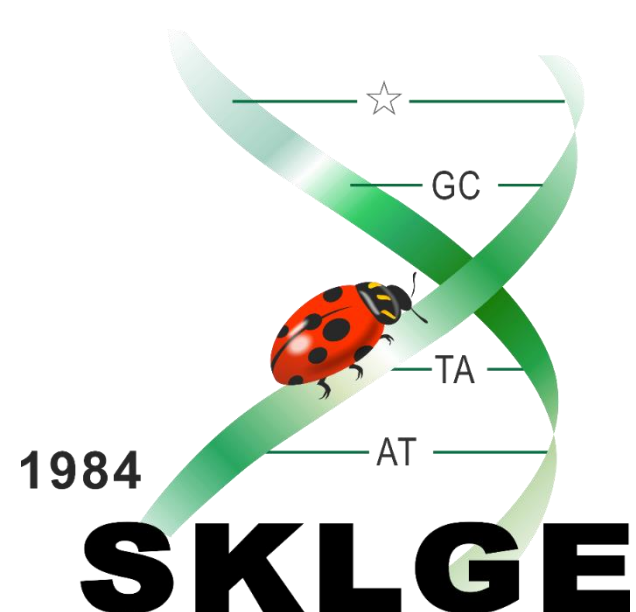
Technical Parameters:

1. Variable plate formats following SBS standard (6, 24, 48, 96, 384, 1536-well), user-defined formats and slides (in slide holder)
2. 16 bit sCMOS 4.4 Megapixel (2100x2100), 6.5 μm pixel size
3. Transmitted light capabilities (brightfield, digital phase contrast)
4. 405 /488 /561 /640 nm solid state laser
5. Water immersion lens module

Applications:

1. High Content Confocal imaging.
2. Live cell imaging.
3. Complex cellular models detection, such as 3D cell culture models and Organoid
4. Fully automated cell segmentation with automatic or manual parameter tuning
5. PhenoLOGIC™ machine learning plug-in available, enabling users to teach the software to create tailored algorithms
6. High-throughput imaging and phenotyping
7. High-throughput imaging based drug screening

Reservations can be made by calling 021-31246592



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

Leica Confocal Microscope Platform STELLARIS 5

STELLARIS 5 is a full-spectrum high-resolution laser confocal imaging system with outstanding performance in resolution, detection sensitivity and spectral freedom. The excitation lasers are equipped with 405 nm and 448 nm and 485-790 nm white light laser, providing excitation tunable from blue to red throughout the spectrum. The detections are equipped with three Leica patented Power HyD ultra-sensitive detectors, which can perform excitation emission spectrum scanning; In addition, it is equipped with LIGHTNING high-resolution imaging module, realizing ultra-high resolution imaging <120 nm; It also provide fluorescence lifetime information (TauSense) in the experiment, removing the reflected light and stray light, and improving the image quality.



Location: E101-2 **Contact:** Genfeng Zhu **Tel:** 31246643

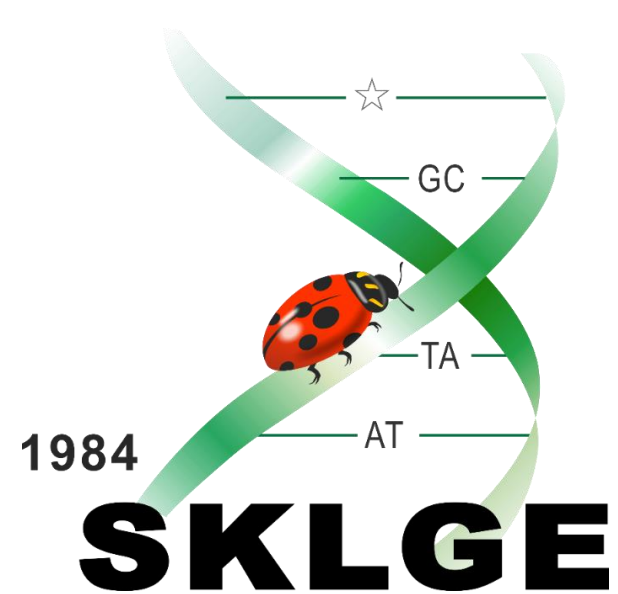
Technical parameters:

1. Pulsed white light laser: 485-790 nm, allow to simultaneously use up to 8 single excitation lines from across the spectrum.
2. Power HyD S detectors, provides higher photon detection efficiency extremely low dark noise, and sensitive spectral detection from 410 to 850 nm.
3. TauSense is comprised of application-oriented imaging tools based on fluorescence lifetime.
4. LIGHTNING technology: resolution $XY \leq 120$ nm, $XZ \leq 200$ nm
5. Scanning speed: 10fps@512X512
6. Objective lens: 10x, 20x, 40x (water) , 63x (oil)

Applications:

1. Spectral freedom confocal imaging
2. Observation of cell/tissue morphology; Three-dimensional reconstruction of cell or tissue structure
3. TauSense Technology:
TauContrast provides immediate access to functional information, such as metabolic status, pH, and ion concentration. TauGating improves the quality of images by removing unwanted fluorescence contributions. TauSeparation helps you expand the combination of fluorescent signals in your experiment beyond the spectral options. TauInteraction provides straightforward detection and quantification of molecular interactions (e.g. protein-protein interaction).
4. Analysis of colocalization or subcellular structure
5. FRAP, FRET and Navigator

Reservation can be made online: <http://lifesupporting.fudan.edu.cn/>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

Laser Scanning Confocal Microscope Olympus FV3000

The Olympus FV3000 is a laser confocal microscope with high sensitivity, high resolution and high shooting speed. The device is equipped with 405nm, 445nm, 488nm, 514nm, 561nm, 594nm, 640nm laser line bands and equipped with four GaAsP high-sensitivity detectors. The device has a complete objective lens, with an electric animal mirror turntable, which can be quickly switched from the low magnification observation of the 1.25X objective lens to the high magnification of the largest 150X objective lens. The Olympus excellent high numerical aperture silicone oil immersion objectives provide bright fluorescence images at higher resolutions in deep tissue. Super-resolution imaging (FV-OSR) is capable of acquiring four fluorescent signals sequentially or simultaneously at a resolution of approximately 120 nm, almost twice the resolution of conventional confocal microscopy.



Location: E101-12

Contact : Jiange Yang

Tel: 31246565

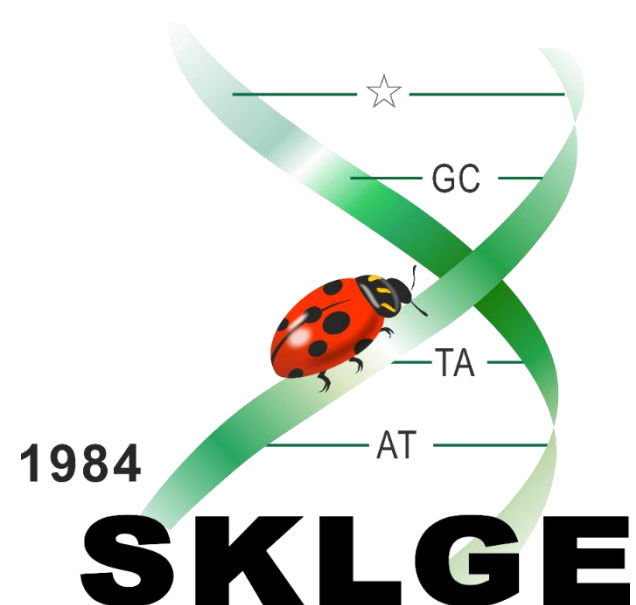
Technical Parameters:

- 1、 Research-grade all-electric inverted fluorescence microscope;
- 2、 Spectral lines of seven all-solid-state lasers included 405/445/488/514/561/594/640nm;
- 3、 Two sets scanning galvanometers: scanning speed can reach to 16fps@512x512 (High-resolution mode) and 438fps@512x32(High-speed mode);
- 4、 Including four cooled GaAsP ultra-high sensitivity detectors which perform ultra-high-resolution imaging of no less than 4 channels with a resolution of 120 nm;
- 5、 Objectives: 1.25X, 4X, 10X, 20X and 40X air objectives, 30X and 60X silicone objectives, 60X, 100X and 150X oil objectives;
- 6、 Hardware infrared anti-drift system;
- 7、 3D deconvolution module.

Applications:

- 1、 High spatial resolution imaging and qualitative, quantitative, timing and localization distribution detection of fluorescently labeled biological materials;
- 2、 High-precision, high-linear spectral scanning, spectral detection, and spectral splitting;
- 3、 High-resolution full-field image acquisition of large specimens;
- 4、 real-time 3D reconstruction and analysis;
- 5、 FRAP、 FRET experiments;
- 6、 Ion measurement, PH measurement and other applications.

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

Leica THUNDER Imager 3D Tissue

Leica Thunder imager is a revolutionized solution for wide field high-resolution imaging. It aims to provide an instantaneous and easy-to-use imaging method for life science research that has the advantages of wide-field imaging speed, low phototoxicity and imaging quality close to that of confocal microscope. The patented intelligent optical digital technology-Computational Cleaning is adopted to optimize the image acquisition of microscope software and hardware, including ultra-high light quantum efficiency camera, precision stage, new light source, data processing module and powerful Las X Software, without sacrificing the depth of field and imaging speed. The effective optical signal is collected and the out of focus signal is removed to realize high-speed, high-definition and high-resolution imaging! The instrument is easy to operate. It can effectively remove the non-focal plane blur signal in tissue section (especially thick section) imaging with one click, and obtain super fine structure, excellent signal-to-noise ratio and excellent axial resolution.



Location: G108 Contact: Bing Zhao Tel: 31246582

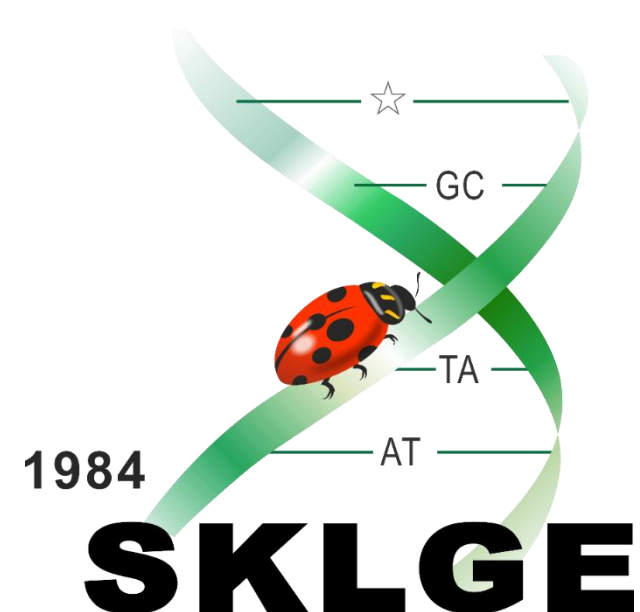
Technical Parameters:

1. Automated upright microscope and THUNDER working station.
2. Dual cameras: 4.2M mono sCMOS DFC9000GT & 20M colored CMOS DMC5400
3. Four Fluo Channels: DAPI、GFP、RHOD、Cy5.
4. Fluo light source: Leica LED3
5. Stage: Scanning Stage for 8 slides
6. Objectives: 5x, 10x, 20x, 40x, 100x (oil)

Advantages:

1. Brilliant results in seconds.
2. Instant display of haze-free images during acquisition - no need to wait until the experiment is finished
3. Achieve image quality with thick samples, formerly only possible with confocal systems
4. LAS-X Navigator enables large FOV preview and seamless stitching.
5. No need to calibrate or adjust moving hardware components

Reservations can be made by calling 021-31246582



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

Laser Scanning Confocal Microscope Nikon A1

With ground breaking technology, Nikon's superior A1 confocal laser microscope enables you to capture high-quality images of cells and molecular events at high speed. A four-channel detector which is equipped with two GaAsP PMTs and two normal PMTs allows easy imaging of a specimen labeled with four probes. The galvanometer scanner is capable of taking up to 4096x4096 pixels. Fluorescence efficiency is increased by 30% by utilizing the industry's first low-angle incidence method on the dichroic mirrors. Higher brightness while maintaining the confocality is achieved by employing the industry's first hexagonal pinhole. Extremely high S/N ratio can also be obtained by implementing Nikon's original dual integration signal processing technology.



Location: E101-12

Contact : Jiange Yang

Tel: 31246565

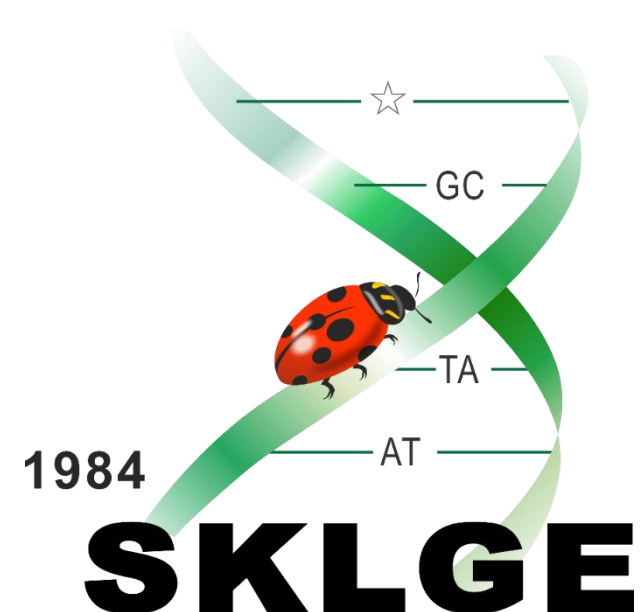
Instrument specifications:

- 1.The system is mounted on a Nikon upright, fluorescence microscope with DIC optics
- 2.4 solid state lasers: 405,488,561 and 640nm;
- 3.Detector: 2 GaAsP and 2 normal PMTs, Transmitted light detector and 32-channel spectral detector;
- 4.Objectives: 10x, N.A. 0.45, W.D. 4.0 mm; 20x, N.A. 0.75, W.D. 1.0 mm; 40x, N.A. 0.95, W.D. 0.21 mm; 40x WI, N.A. 1.15, W.D. 0.60 mm; 60x OI, N.A. 1.40, W.D. 0.14mm;

Applications:

- 1.High-resolution multicolor image acquisition and multidimensional (X,Y,Z,t, λ ,multi-point) imaging;
2. Large imaging(image tiling);
3. 3D reconstruction ;
4. FRET;
5. Colocalization analysis;
- 6.Other diverse measurement and statistical processing function.

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

Leica TCS SP8 Confocal Microscope

Leica TCS SP8 confocal imaging system features Leica's patented HyD super sensitive detector for high-resolution imaging with high sensitivity and low noise. Prism dispersion and spectral detection provide maximum flexibility for multi-color image acquisition. And the resonant scanner could achieve the imaging speed with 28 fps at 512 x 512 pixel resolutions. This offers several advantages including the ability to control depth of field, elimination or reduction of background information away from the focal plane (that leads to image degradation), and the capability to collect serial optical sections from thick specimens. Multi-colour image acquisition especially dim signals and observations of living cells or tissues could also be achieved easily.



Location: C413

Contact: Genfeng Zhu

Tel: 31246643

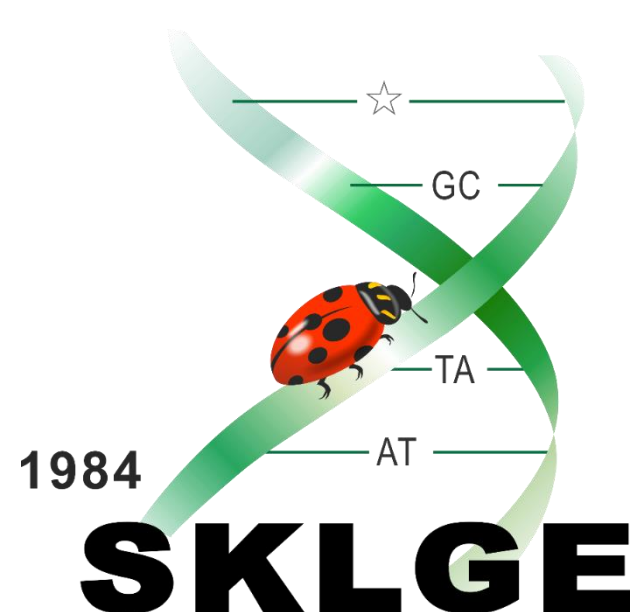
Technical Parameters:

1. Inverted microscope
2. Lasers: 405, 458, 488, 514, 561 and 633nm
3. Objectives: 10x, 20x, 40x(oil), 100x(oil), 63x(Water)
4. Equipped with super sensitive detector (HyD)

Applications:

1. Distribution and localization of single color or multicolor fluorescence signals in cells and tissues
2. Large sample tile scan imaging
3. FRET, FRAP, live data mode and other related experiments
4. Overlay of fluorescence images and DIC images
5. Equipped with resonant scanner, max 28 fps high-speed image acquisition.

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

High Sensitivity Laser Scanning Confocal Microscope Zeiss LSM710

LSM710 can provide deeper, more sensitive image acquisition and optical rectification, and on the basis of improving the effective signal, it can greatly reduce the noise signal, making high-quality fluorescence imaging possible. It is mainly used in the study of tissue and cell morphology, to determine the subcellular localization of fluorescent markers in cell biological samples, to analyze the co-localization and spatial distribution of multiple markers, and to preliminarily judge their mutual relations and effects.



Location: E101-13

Contact : Dan Shi

Tel: 31246565

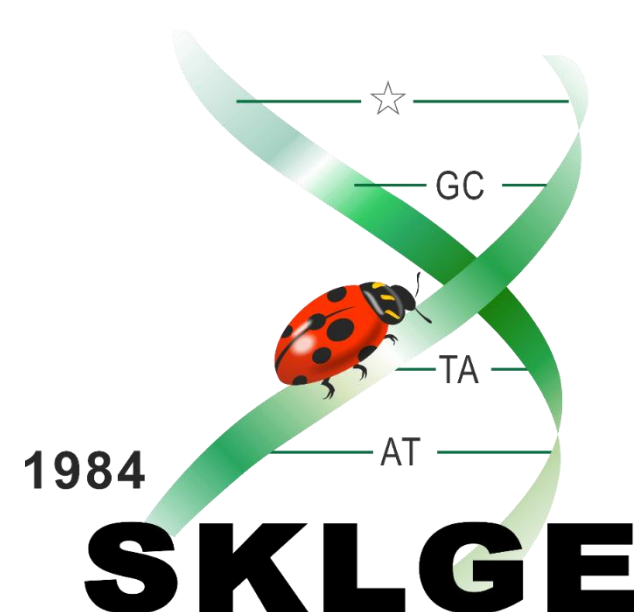
Specification and configuration:

1. Inverted microscope, using a 0.17mm cover slide or a culture dish with a glassy bottom of 0.17mm
2. Equipped with 405,488,561,633 laser tubes, it can excite 405,454,488,514,561,633 emission spectra
3. Objective lens: 10x, 20x, 25x (water lens),40x, 63x (oil lens)

Functional application:

1. Localization of fluorescence signal
2. Morphology imaging
3. 3D image construction
4. Time series imaging
5. Spectral splitting
6. FRAP, fluorescence bleaching experiment
7. FRET, resonance transfer of energy
8. Calcium wave imaging
9. Determination of the relative and absolute concentrations of metal ions, such as calcium ions, copper ions, etc.

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

ArcturusXT Laser Capture Microdissection System

The Applied Biosystems™ ArcturusXT LCM System is a unique microdissection system that combines the power of infrared (IR) laser capture and ultraviolet (UV) laser cutting in one modular platform. The solid-state IR laser delivers a gentle capture technique that preserves the overall biomolecular integrity of cells, and is ideal for both single cells and small numbers of cells. The solid-state UV laser permits superior speed and precision, and is well suited for microdissecting dense tissue structures, and capturing large numbers of cells. This unique combination of two lasers in one system helps ensure that sample custody is maintained at all times, thereby enabling researchers to uncover unique molecular signatures that would have otherwise been obscured in a heterogeneous cell population.



Location: E101-12

Contact : Jiange Yang

Tel: 31246565

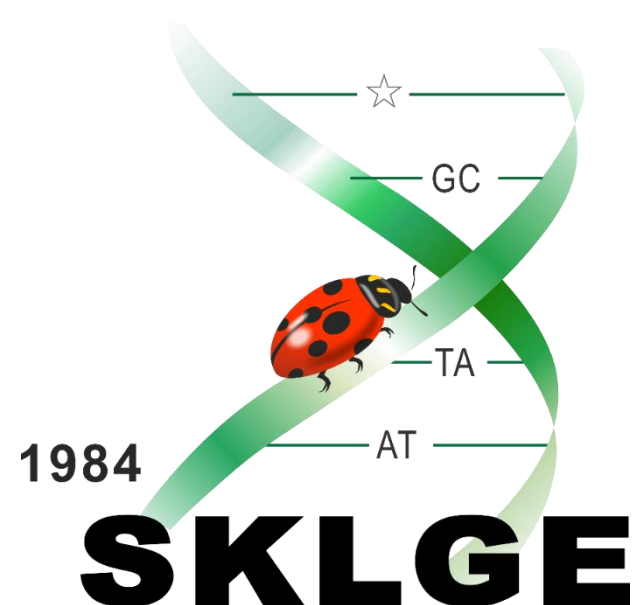
Instrument specifications :

- 1、Microscope: Nikon Eclipse® Ti-E microscope base
- 2、Infrared (IR) Capture Laser: solid-state, near-IR (810 nm);
- 3、UV Cutting Laser: solid-state, passive Q-switched, diode-pumped (355 nm)

Applications :

Preparation of homogenous isolates of specific subpopulations of cells from which DNA/RNA or protein can be extracted for RT-PCR, quantitative PCR, next-generation sequencing, immunoblot blot analyses, and mass spectrometry.

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

Inverted Fluorescence Microscope OLYMPUS IX71

Olympus IX71 inverted fluorescence microscope is designed to improve work efficiency and to enhance imaging reliability by providing accurate positioning and repeatability of light. It's ideal for routine experiments, recording, and other scientific research tasks.



Location: E101-12

Contact : Dan Shi

Tel: 31246565

Specification and configuration:

1. Inverted fluorescence microscope
2. Equipped with objective lenses of 4X, 10X, 20X and 40X
3. Configured fluorescent filters of DAPI, GFP, RFP
4. DP70 colorful CCD camera
5. Olympus DP controller image acquisition and processing software

Functional application:

1. Suitable for observation of cells in glass slide, plastic culture dish, glass culture dish and porous plate
2. BF, Ph and fluorescence can be observed

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>

Inverted Fluorescence Microscope OLYMPUS IX73

Olympus IX73 is designed to satisfy a variety of research needs. Olympus UIS2 optics enable high resolution, high S/N primary images regardless of the observation method. All fluorescence mirror units feature filters treated with a specially-developed coating that minimizes noise by absorbing more than 99 % of stray light. The outstanding performance and high transmittance of the mirror units ensure efficient fluorescence signal detection. With additional modules for expanded functionality, the IX73 is perfectly suited for a changing research environment.



Location: E101-12

Contact : Dan Shi

Tel: 31246565

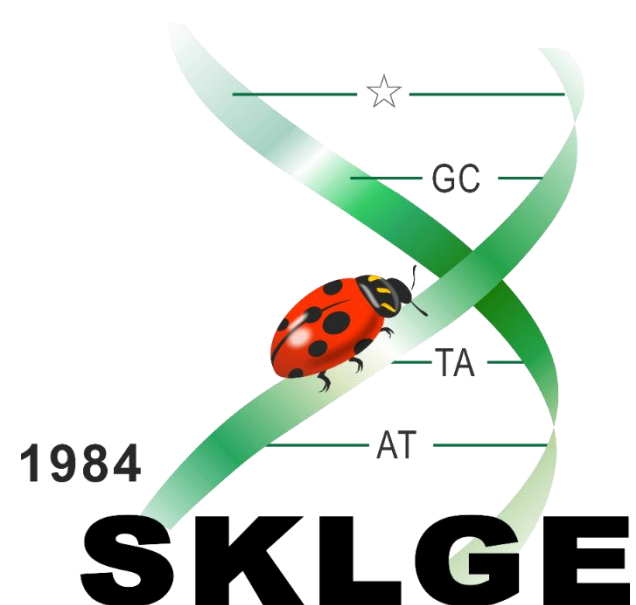
Specification and configuration:

1. Inverted fluorescence microscope
2. Equipped with objective lenses of 4X, 10X, 20X, 40X and 60X
3. Configured fluorescent filters of DAPI, GFP, RFP and CY5
4. DP80 colorful/monochrome CCD camera with dual chip
5. Olympus cellsens standard image acquisition and processing software

Functional application:

1. Suitable for observation of cells in glass slide, plastic culture dish, glass culture dish and porous plate
2. BF, Ph, DIC and fluorescence can be observed
3. Time series
4. Image Mosaic
5. Depth of field expansion

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

Stereo Zoom Microscope Zeiss Axio Zoom.V16

The system has 16x variable times range and high numerical aperture ($NA = 0.25$) which is much superior to other stereo zoom microscopes. It can obtain ultra-high brightness in the large field viewing which is suitable for the observation of large size samples and whole model organisms under fluorescence pattern .



Location: E101-12

Contact : Dan Shi

Tel: 31246565

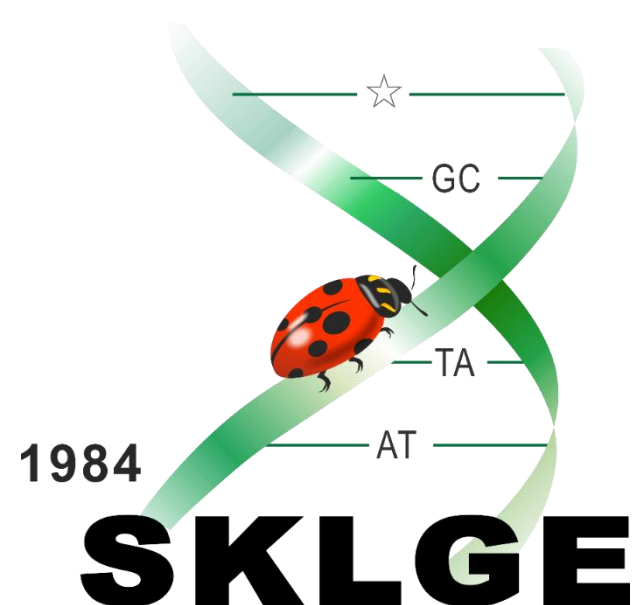
Specification and configuration:

1. Equipped with 0.5x and 1.5x objective lenses
2. Bright field light sources: Bottom lighting and ring lighting
3. GFP and RFP fluorescence filters are configured
4. Fully automatic main frame

Functional application:

1. It can be used for transmission light and fluorescence photography of small sample, suitable for zebrafish, nematode, drosophila and other samples
2. Multi-layer scanning, expand the depth of field and synthesize clear pictures with all-electric main frame
3. Time series imaging ,equipped with automatic fluorescence shutter, imaging for a long time, less fluorescence bleaching

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

Upright Fluorescence Microscope Nikon Eclipse Ni-U

With its superior basic performance, bright and sharp optical system, flexible stratum structure, objectives with long working distance and high NA, and ultimate ease of operation, Nikon's advanced upright microscope ECLIPSE Ni-U can support a wide range of observations, from clinical examinations to bioscience research.



Location: E101-1

Contact : Dan Shi

Tel: 31246565

Specification and configuration:

1. Upright fluorescence microscope
2. Equipped with objective lens of 4X, 10X, 20X, 40X, 100X (oil lens)
3. Configured fluorescent filters of DAPI, GFP, RFP, CFP

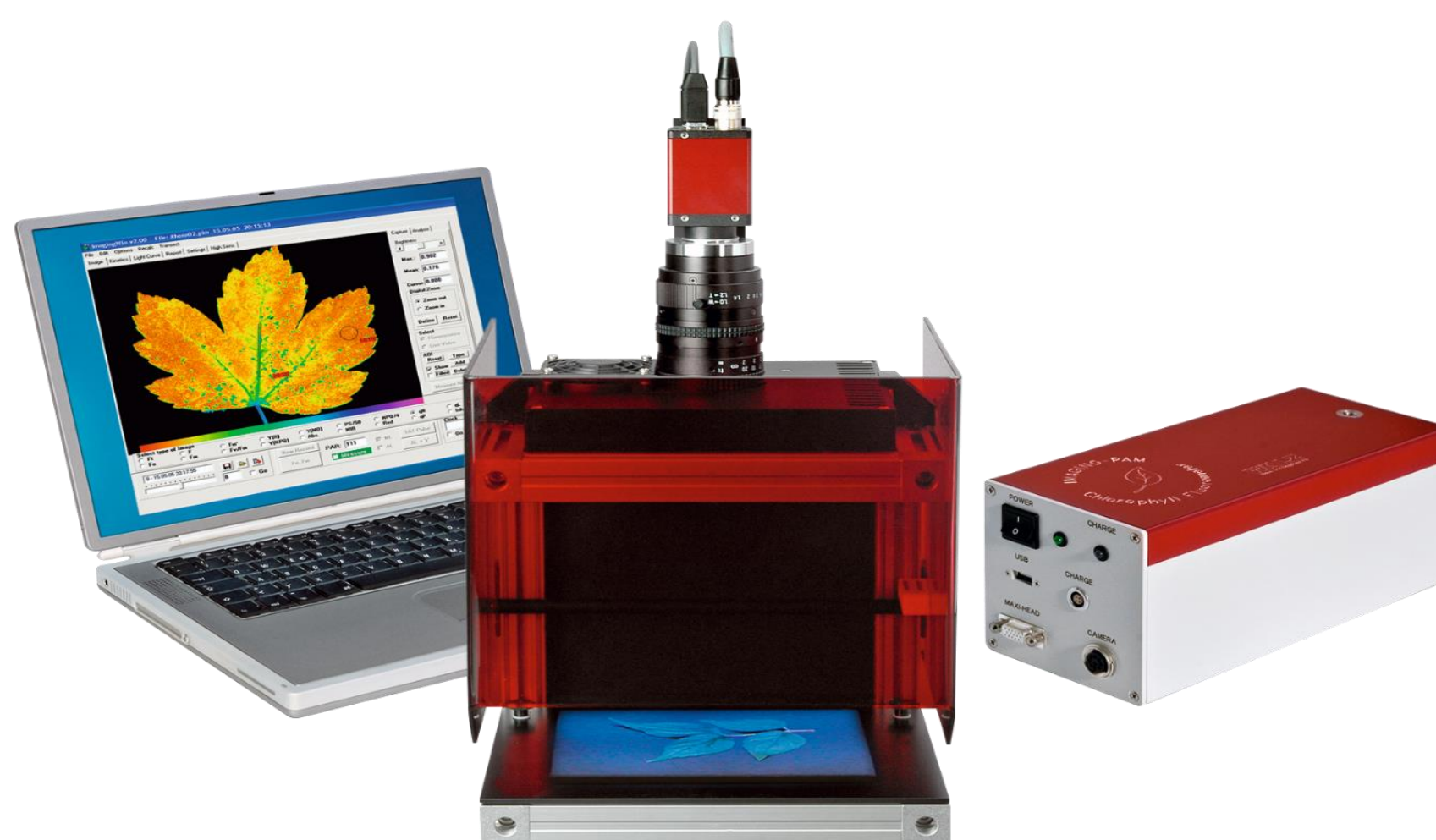
Functional application:

1. Suitable for observation of fixed samples
2. Ordinary bright field, Ph, DIC and fluorescence can be observed

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>

PAM Chlorophyll Fluorescence Imaging System MAXI-IMAGING-PAM

The PAM Chlorophyll Fluorescence Imaging System is a photosynthesis measurement system that combines pulse amplitude modulated (PAM) chlorophyll fluorescence technology and CCD imaging technology. Without any pre-processing, It can directly image at least 18 parameters related to photosynthetic energy conversion and utilisation, such as F_t , F_o , F_m , F_v/F_m , F , F_m' , $Y(II)$, $Y(NO)$, $Y(NPQ)$, NPQ , qN , qP , qL , $PS/50$, Abs , NIR , Red , Inh , and so on. It can be programmed to measure induction curves for quenching analysis, Rapid light curves and dark recovery, as well as manual measurements, and automatically analyses the dynamic trends of all fluorescence parameters during the measurement process.



Location: C412

Contact: Genfeng Zhu

Tel: 31246643

Technical Parameters:

1. Camera and lens: 2/3' camera CCD, 1392×1040 pixels, Frame rate 30 fps, GigE communication.
2. Light source: 44 450 nm blue LEDs, frequency 1-8Hz, intensity 1-20 levels, Actinic light intensity 1-20 levels, maximum intensity 1900 $\mu\text{mol m}^{-2} \text{s}^{-1}$ PAR, saturation pulse intensity 1-10 levels, 240-840ms adjustable, maximum intensity 4000 $\mu\text{mol m}^{-2} \text{s}^{-1}$ PAR.
3. Imaging area: 9cm×12 cm when working distance is 18.5cm; 11cm×15 cm when working distance is 22.5cm.

Application:

1. Measure photosynthetic light energy conversion efficiency
2. Quenching analysis
3. Early detection of stress
4. Measurement of leaf Abs .
5. Mutant screening
6. Measurement of leaf lateral heterogeneity
7. Algae toxicological studies

Reservations can be made by <http://lifesupporting.fudan.edu.cn/>

NightShade LB985 In-vivo Plant Imaging System

The NightShade LB985 In-Vivo Plant Imaging System is a modular, easy to use optical imaging system dedicated to in vivo analysis of plants. Its core component is an ultra-sensitive CCD camera. The camera can be mounted on top or the side of the darkroom, which makes the signal be captured from top or side view. The temperature and humidity can be controlled in the darkroom. This system can do various fluorescence and luminescence imaging to know about the dynamic change of cells and gene expression in vivo.



Location: C412

Contact: Genfeng Zhu

Tel: 31246643

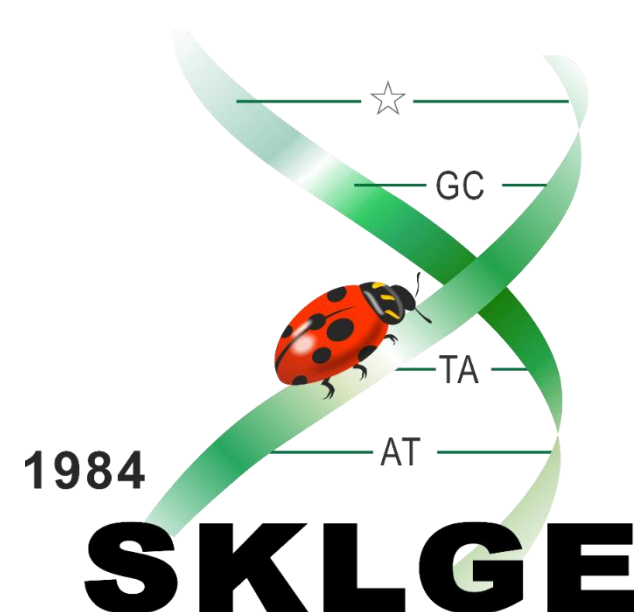
Technical Parameters:

1. Camera: resolution: 1024×1204,optical resolution: < 130um; wavelength range: 300-1050nm
2. Darkroom: light-tight, sample height: up to 250mm; four LED light source.
3. X/Y sample plate: moving size: up to 280×210mm; height:95mm
4. Fluorescence model: light source: 75W halogen lamp; excitation wavelength range: 340-1050nm; Four built-in optical fiber for ensuring the uniformity of excitation light.
5. Daylight simulation system in darkroom: two LED panels, wavelength: white, 470nm, 660nm, 730nm.

Application:

1. Plant circadian rhythms research
2. Plant stress resistance research
3. Plant pathogen infection research
4. Continuous observation of plant growth
5. Gene breeding screening
6. in-vivo plant gene expression and clone screening

Reservations can be made online at <http://lifesupporting.fudan.edu.cn/>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

DynaPlant® High-throughput Platform for Dynamic Phenomics of Plant Seedlings

DynaPlant® is a high-throughput platform for dynamic imaging of plant seedlings which is capable to provide kinetic analyses in a space resolution of micrometers and time resolution of minutes. It is designed to fulfil the demands for large-scale screening and phenomics. (1) High throughput: Up to 300 samples can be imaged simultaneously within a 5-minute cycle. (2) High resolution: 1.2 $\mu\text{m}/\text{pixel}$. (3) Multiple experimental conditions: Perform pre-programmed experimental treatments individually or in combination as wish. (4) Automatic analysis: Utilizing GPU-accelerated machine-vision algorithms, DynaPlant® can automatically analyze massive amounts of image data.



Location: G110

Contact: Genfeng Zhu

Tel: 31246643

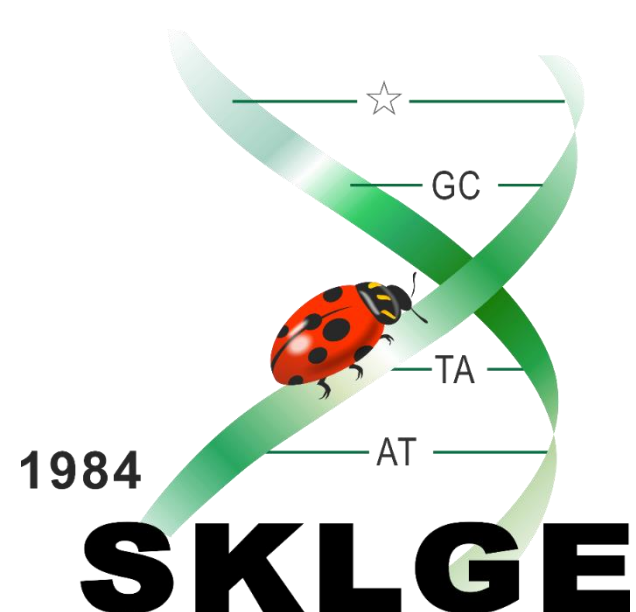
Technical parameters:

1. Supports up to 16 petri dishes
2. Image resolution: 36 million pixels, 1.2 $\mu\text{m}/\text{pixel}$
3. High-accuracy 3D motion platform: 1 μm
4. Experimental conditions control:
Light (450 nm/ 660 nm/ 730 nm)
Gas (CO_2 400-5000 ppm, C_2H_4 0-10 ppm)
Temperature (12-35°C)
Gravity (Fixed-angle rotation, or continuous disturbance)

Applications:

1. Hypocotyls: length, growth rate, curvature and its changing rate
2. Apical hooks: curvature and its changing rate
3. Roots: length, growth rate, curvature and its changing rate
4. Seeds: germination time, accumulated germination rate
5. Root hairs: distribution of position, growth rate
6. Chemiluminescence: real-time quantification of Luciferase activity

Reservations can be made at <http://lifesupporting.fudan.edu.cn/>



遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

Phenotyping Gantry Entoscan Plant Saplings High-throughput Dynamic Imaging Analysis System

Phenotyping Gantry Entoscan is a high-throughput dynamic imaging analysis system for plant saplings research. It's equipped with multi-groove hydroponic unit, multispectral camera, and chlorophyll fluorescence camera. Using different nutrient solution, researchers can obtain data for analysis Phenotypic, Growth Trend, Plant Pathology, Insect, Pest, Plant Health Assessment, Stress-Tolerant (Drought Resistance, Haloxene, Thermal Stress) between experiment and control groups. With intelligent environment including temperature, humidity, lighting spectrum, carbon dioxide concentration control system, high-throughput imaging data can be achieved for further analysis.



Location: G110

Contact: Genfeng Zhu

Tel: 31246643

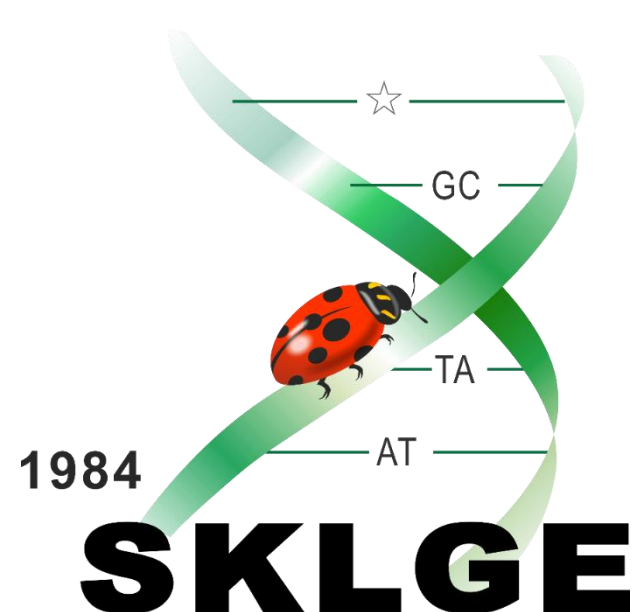
Technical Parameters:

1. Camera: multispectral camera, chlorophyll fluorescence camera
2. 16 spectrums lighting system
390/420/450/480/525/570/630/660/730/780/850/870/890/910/940/970nm
3. Eight (8) independent grooves, nineteen (19) plugs per groove
4. Measurable fluorescence induction curve, fast light curve (Powerful curve fitting function)
5. Downward four spectrums LED and independent controlled Temp. and RH, LED including B450/W400-700/R660/IR730nm $\pm$ 10nm, each wavelength is adjustable from 0 to 100%.

Applications:

1. In-built vegetation index: NDVI, GI, etc. Can be used in vegetation coverage, chlorophyll concentration, plant healthy.
2. The user can set the parameter according to their needs. Automatically clustering into healthy/disease distribution area to instead of visual estimation.
3. Environment control: Temperature, RH, carbon dioxide concentration and four wavelength to demonstrate different environment.
4. Chlorophyll fluorescence camera system: Fo, Fm, F, Ft, Fv/Fm, Y(II), qL, qP, qN, NPQ, Y(NPQ), Y(NO), ETR, Abs, NIR.
5. Plant Stress-Tolerant physiology: Through specific spectrum's excitation and acceptance to analysis the invisible pathological disposition

Reservations can be made at <http://lifesupporting.fudan.edu.cn/>



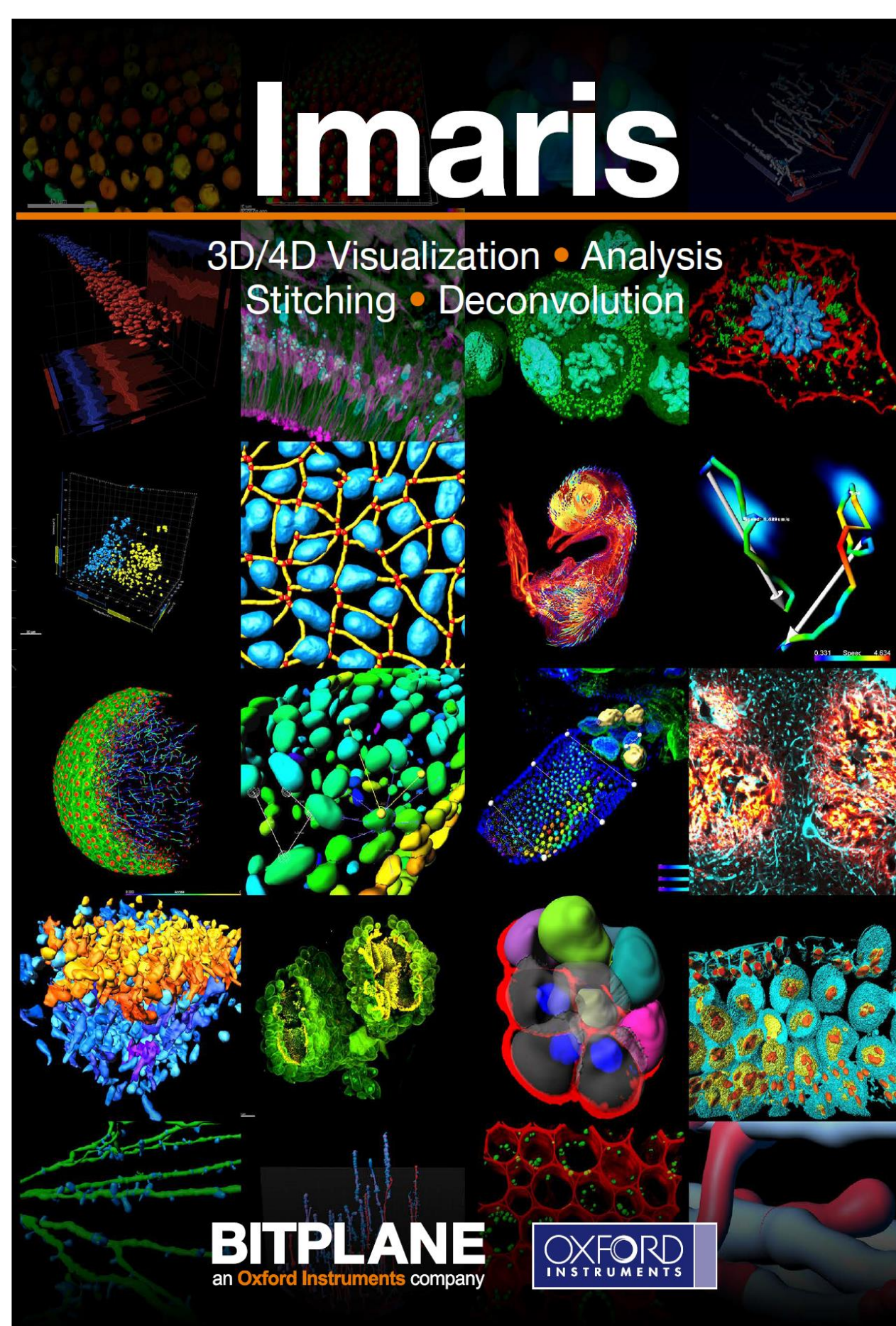
遗传工程国家重点实验室
State Key Laboratory of Genetic Engineering



复旦大学生命科学学院
School of Life Science Fudan University

IMARIS

Imaris gives you complete power and flexibility of all image analysis functionalities at your fingertips. Visualization of complex 3/4D microscopy datasets with automated Spots and Surfaces detection and visualization, smart detection of complex objects, tracing of neurons, blood vessels (no lumen) or other filamentous structures, tracking including cell division detection, batch analysis and a wide range of customized analysis powered by MatLab or Python, stitching multiple tiles in XYZ.



Location: E101-13

Contact : Jiange Yang

Tel: 31246565

Applications:

Reconstruct and Visualize complex 3/4D microscopy datasets

Precisely detect and segment objects

Calculate size and shape parameters, signal intensity, and relative position

Track objects over time (4D tracking) and display motion related parameters

Detect, trace and measure neurons' dendritic trees, axons, spines, blood vessels and microtubules

Detect cells and examine relationships between cells and cellular components

Check colocalization of fluorescent signal in 3D over time

Use interactive 5D plots (x, y, z, color, scale) to discover hidden relationships

GPU-accelerated Deconvolution to improve image quality

Align and stitch multiple tiles with many channels in XYZ

A wide range of customized analysis powered by MatLab or Python

Automate the workflow for similar datasets

Reservations can be made online at <http://lifesupporting.fudan.edu.cn>