Super-Resolution Imaging System

Three-Dimensional Simultaneous Multi-Channel Super Resolution Imaging

NanoBioImaging Ltd.
**Super-resolution microscopy has become a powerful imaging tool for biology and material science. To obtain reliable and high-resolution imaging results, it requires not only the knowledge of biology, but also the knowledge of physics, chemistry, computer science, and engineering. Yet, it has been challenging for most scientists.**

In collaboration with HKUST Super-Resolution Imaging Center, NanoBioImaging (NBI) has built an inter-disciplined expert team covering optics, computer science, biology and chemistry. NBI offers customized products to our clients and comprehensive support including hardware maintenance, software update, protocol design, data analysis, and on-site and on-line troubleshooting services in all aspects.

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**Advantages**

- **20 nm resolution**
- Simultaneous multi-channel imaging
- Active locking system with nanometer precision
- Optimized imaging buffer
- No warm-up time required
- 10 times greater than conventional optical microscopes
- Time-efficient, minimizing photobleaching
- Highly stable and efficient
- Balanced photochemical properties for different channels
- Time-saving

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**Your Best Choice**

- Stable and efficient hardware
- Professional analysis software
- Comprehensive technical support
- User-friendly software
- Easy and seamless workflow
- Running in general lab conditions, even at an exhibition
Stable and Efficient Hardware

**Most stable and reliable**

NBI developed active locking system to correct the sample drifting in real-time during data acquisition. The samples can be “locked” with nanometer precision and no post-acquisition correction is required. This not only guarantees reliable results without artifacts caused by software correction, but also saves users’ time waiting for system stabilization and thermal equilibrium after each sample loading.

**Highly efficient**

NBI featured simultaneous multi-channel imaging delivers super resolution images of multiple targets at the same time, shortening the data acquisition time to 1/3 of other commercial products. What’s remarkable, it minimizes photobleaching which is severe in sequential super-resolution imaging of multiple channels.
Rohdea is an intelligent and user-friendly super-resolution imaging software developed by NBI. It produces reliable data and provides users with the best operation experience.

1. **Simplified imaging process**

"What You See Is What You Get", simplifies operation process, and is user-friendly. We summarize the imaging process into four steps of the super-resolution imaging: "choosing region"-"widefield capture"-"parameter adjustment"-"super-resolution capture".

2. **Real-time and transparent parameter adjustment**

The imaging results are subject to the parameters used in the data acquisition process. Rohdea provides a real-time parameter adjustment module that allows users to visually compare the effects of parameter changes on imaging results.

3. **Up-to-date algorithms and real-time data reconstruction**

Rohdea integrates multiple up-to-date algorithms and functions for data acquisition and data processing. In particular, the results and parameters of SR image reconstruction are presented in real time, which is convenient for users to adjust in time.

4. **Convenient user data management**

Rohdea allows the generation, modification, and automatic saving of parameter settings and imaging results. Besides, it provides parameter template for similar experiments, which is convenient for users to select and optimize in subsequent experiments.

5. **Strong data analysis features**

Rohdea implements algorithms including clustering analysis, co-localization analysis, distance measurement, image processing, etc., delivering results that can be directly used for publications.
Full Service

Professional training—more than operating the instrument

Experts from NBI team cover physics, computer science, biology and chemistry. NBI is ready to share our knowledge of principles, mechanisms and practices in all aspects of super-resolution microscopy with our customers.

Comprehensive support

1 Super resolution imaging solution

With our varied technical background and extensive imaging experiences, NBI experts help users’ imaging kick off right away by providing project consultation, feasibility analysis, protocol design etc..

2 Sharing our knowledge base of sample preparation and imaging solutions

We share our optimized sample preparation protocols and imaging configuration templates with our users, with the aim of helping them obtain the best imaging results within the shortest time.

3 Online and on-site support beyond maintenance

Our technical support not only includes hardware maintenance, but also online and on-site consultation on rational of super-resolution fluorescent imaging, experimental protocols, data analysis and modeling, manuscript drafting, etc..

4 Long-term collaboration—growing up together with users

NBI is willing to collaborate with customers in a long-term manner. We will provide customers our latest techniques. We are also willing to meet your individualized technical demand.

5 Imaging service

For free trails, please contact imagingservice@nbi.hk

(Images acquired with NBI SRiS 2.0, in cooperation with Herrup Group in HKUST)
Examples of Application

Fields of application

- Cell biology
- Neuroscience
- Microbiology
- Immunology
- Nanomaterials
- Subcellular structures
- Protein localization
- Protein–protein interaction
- Chromatin organization
- ...

Neuron Synapse

Figure 1. Super-resolution imaging of neuron synapse in mouse brain slices. (Fig. a, c & e) Widefield images of the synapse structures. (Fig. b, d & f) Super-resolution images showing the synapse and well-separated pre-synapse & post-synapse structures.

(Images acquired with NBI SRiS 2.0, in cooperation with Herrup group in Hong Kong University of Science and Technology)

Nucleic acid–FISH

Figure 2. Three-dimensional super-resolution images of telomere DNA. (Fig. a) Widefield image of single focus formed by telomere DNA. (Fig. b & c) Super-resolution images of two telomere foci, corresponding to the foci within the white boxes in the widefield image. Super resolution images show detailed structures, of which the changes within each focus could be easily identified.

(Images acquired with NBI SRiS 2.0, in cooperation with Yong Zhao group from Sun Yat-sen University)

Organelles

Figure 3. Three-channel super-resolution images of COS7 cell organelles. (Fig. a) Mitochondrial outer membrane protein TOM20 (magenta), mitochondrial matrix protein COX IV (blue), and Golgi protein TGN46 (green). (Fig. b) Mitochondrial outer membrane TOM20 (red), nuclear membrane protein lamin (blue), and Golgi protein TGN46 (green).

(Images acquired with NBI SRiS 3.0 by NBI)
Examples Of Application

Golgi Apparatus

Figure 4. Super-resolution images of cis–Golgi network protein GM 130 and trans–Golgi network protein Golgin 97. (a) Widefield image shows the overlapping of these two proteins. (b) Super-resolution image clearly shows that the two proteins locate at two layers of golgi apparatus.

(Images acquired with NBI SRIS 2.0, in cooperation with Guo Lab in Hong Kong University of Science and Technology)

Yeast Organelle

Figure 5. Super-resolution images of tubulin proteins Tub1 and Tub4 in yeast spindle-pole body. GFP and RFP tagged tubulin proteins were transfected into the yeast cell, and further stained with GFP nanobody and RFP nanobody, respectively. (Fig. a & b) widefield images. (Fig. c & d) Corresponding super-resolution images, two-layer structure of γ–tubulin complex was resolved.

(Images acquired with NBI SRIS 2.0, in cooperation with Dr Yuanliang Zhai in Hong Kong University of Science and Technology)

Mitochondria

Figure 6. 3D Three-dimensional super-resolution images of mitochondria in COS7 cell. The mitochondrial outer membrane TOM20 was labelled indirectly. The mitochondria showed hollow tube structure.

(Images acquired with NBI SRIS 2.0 by NBI)
Selected Publications by NBI SRiS Users


# System Configuration

## SRiS 2.0 Series

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SEEING IS BELIEVING