

# Creation of new diagnostic techniques by imaging biomolecules at nano-scale resolution

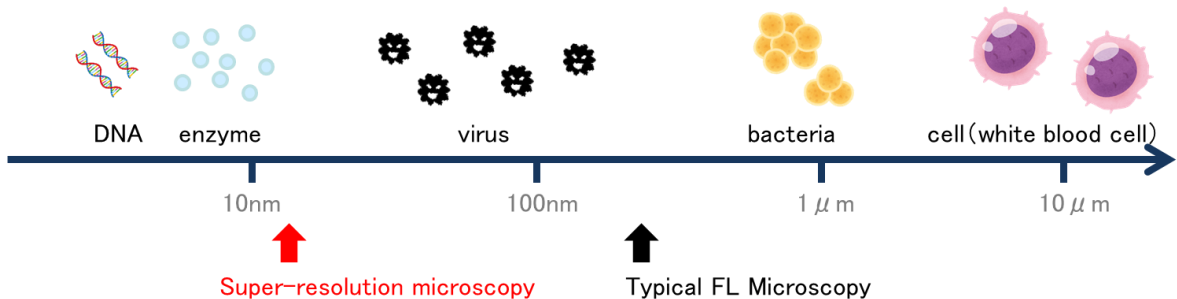
## Development of a super-resolution microscope

Device: Super-resolution microscope

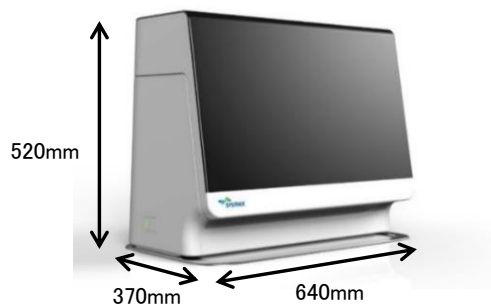
We have been developing super-resolution, molecular-imaging technology, which enables us to observe the locations of genes in a cell and the shapes of proteins in detail. Such images are difficult to observe using conventional optical microscopy.

In the bio-imaging field, observation of ultrastructure is an essential technology to understand life phenomena. Observation using visible light can lessen cell damage; however, in principle, typical fluorescence microscopy does not allow observation of ultrastructure less than 200 nm.

Super-resolution microscopy, which is related to the 2014 Nobel Prize for Chemistry, has broken the limits of optical microscopy spatial resolution. We have developed a desktop-type, super-resolution microscope for practical diagnostic use. We supposed that the super-resolution microscope would allow for the observation of live-cell ultrastructure and protein conformation that causes disease and would lead to promotion of the development of novel diagnostics.



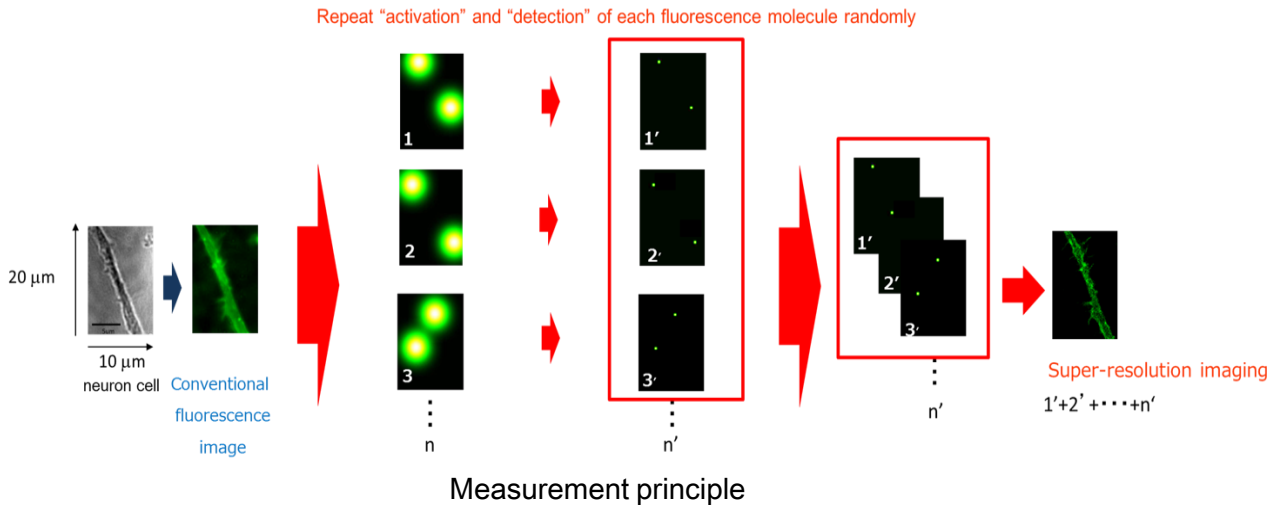
### Molecular-size and imaging technology



Super-resolution microscope (prototype)

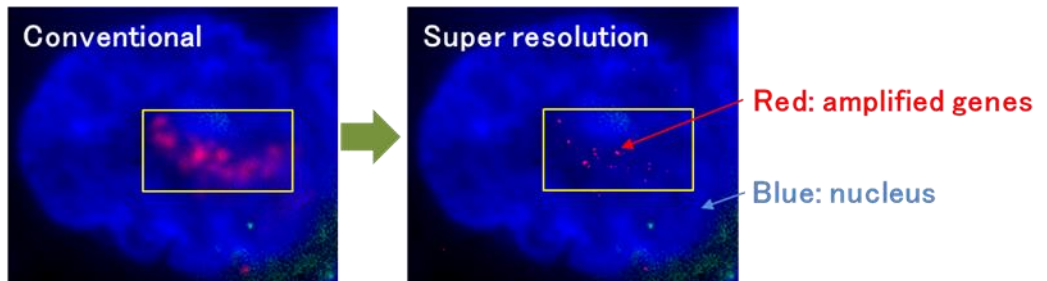
## Super-resolution imaging technology

This microscope has been co-developed with Prof. W. E. Moerner (Stanford University) who was awarded the 2014 Nobel Prize for Chemistry. Spatial resolution that is approximately 10 times higher can be achieved by combining single fluorescent molecule detection technology and image analysis technology.



### Observed image 1 (Her2 gene)

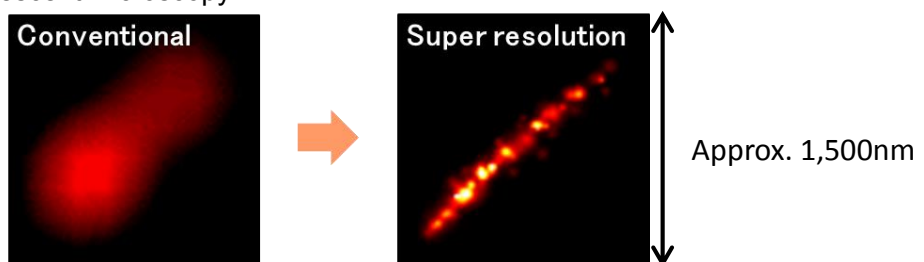
Amplified Her2 genes in breast cancer cells can be observed clearly by super-resolution microscopy compared to typical fluorescence microscopy.



FISH images by conventional microscopy and super-resolution microscopy

### Observed image 2 (protein fibrils)

Minute protein structure was confirmed using a super-resolution microscopy compared to conventional fluorescent microscopy.



Observed image of protein fibrils