



Pushing the limits: 3 D Single Molecule Imaging

The resolution capability of this microscopy patent portfolio has reached the 10 nm range and is therefore clearly well below the physical limit of 200 nm as defined by Abbes law (1873) which postulates this as the theoretical limit of resolution for light microscopy.

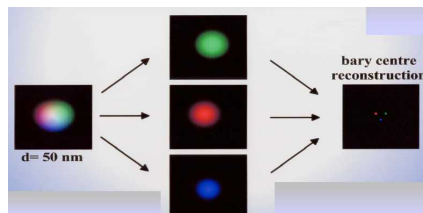
Combined with a high data acquisition (DAQ) rate, the newest development allows recording of three dimensional (3D) nanoscopy datasets of entire cells in about 2 minutes.

It is therefore the world's fastest nano light microscope that allows large scale investigation of supramolecular complexes including living cell conditions.

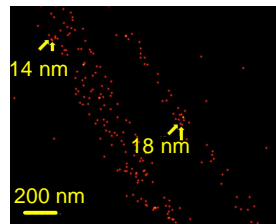
The actual invention allows 3 D imaging of biological preparations marked with conventional fluorescent dyes.

The light nanoscopy portfolio comprises several applications in the field of genome staining, high throughput screening (HTS) and computer simulations.

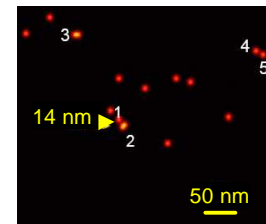
The methods will be permanently developed further and have applications in the area of molecular cell biology, medicine, pharmaceutical research and materials research.



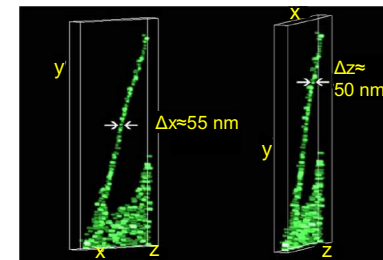
SPDM Principle:
Sharpening of Fluorescent Spots to molecular dimensions



SPDM: $\Delta d = 14 + 18$ nm



SPDM: 1-2: $\Delta d = 14$ nm



3D Nanoscale (x,y,z) Imaging

arrows left:
 $\Delta x \sim 55$ nm

arrows right:
 $\Delta z \sim 50$ nm

Applied Physics
in print

Your Advantage at a Glance:

- 2 D SPDM: localization accuracy down to ~ 5 nm, Effective Optical Resolution (EOR) ~ 10-20 nm**
- 3 D axial resolution: position ~ 1 nm, size ~ 40 nm for large object areas**
- 3 D effective nanoscale optical resolution: combination of 2 types of measurement**

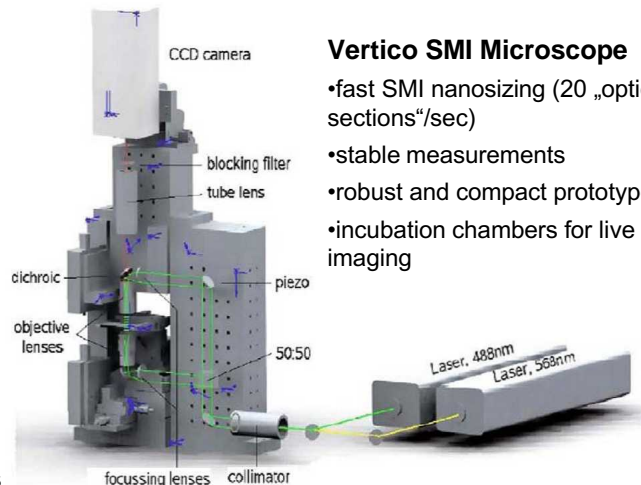
lateral (x,y) SPDM

(Spectral Precision Distance/
Spectral Position Microscopy)

axial (z) SMI

(Spatially Modulated
Illumination)

- ideal for large areas like whole cell imaging
- high speed, stable system
- use of conventional fluorescent dyes
- analysis of vital biological systems
- simplified preparation of probes



Vertico SMI Microscope

- fast SMI nanosizing (20 „optical sections“/sec)
- stable measurements
- robust and compact prototype
- incubation chambers for live cell imaging

Prof. Christoph Cremer

Kirchhoff-Institute of Physics
Institute of Pharmacy und Molecular
Biotechnology/Bioquant Center, University of
Heidelberg, Germany
Institute for Molecular Biophysics/The Jackson
Laboratory, ME, USA

All patents concerning the basic technology (SMI, SPDM, LIMON) have been granted in US and Germany or Europe. Patents on the new inventions have been filed in 2008.

Technology Transfer

The Technology Licence Office GmbH is charged with the commercialization by the Universities in Baden-Württemberg, Germany and now offers companies the opportunity to obtain licenses to exploit these new and promising technologies.

For further information please contact:

Dr Andrea Nestl

nestl@tlb.de

TLB GmbH (Technology Licensing)

Ettlinger Straße 25, 76137 Karlsruhe, Germany

Tel +49 721 79004-0, Fax +49 721 79004-79

www.tlb.de

