New modalities in Re-scan Confocal Microscopy (RCM)

Ronald M.P. Breedijk[1], Giulia de Luca[1,2], Venkataraman Krishnaswami[1,3], Peter Drent[5], Ron A. Hoebe[3] and Erik M.M. Manders[1,4,5]

Corresponding author: manders@uva.nl

[1]Innovative Microscopy group, Swammerdam Institute for Life Sciences, University of Amsterdam, Amsterdam, The Netherlands
[2]current address: Scientific Volume Imaging, Hilversum, The Netherlands.
[3] Department of Cell Biology and Histology, Academic Medical Centre, Amsterdam, NL
[4]Nikon Centre of Excellence on Super Resolution Microscopy Development, University of Amsterdam, Amsterdam, The Netherlands
[5]Confocal.nl BV, Amsterdam, The Netherlands

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In the last few years the Re-scan Confocal Microscope [1] has become a well-known and simple technology to obtain images with an improved resolution (170 nm) as compared to standard confocal microscopy (240 nm). The technology is based on a standard confocal microscope with an additional scanner (the re-scanner) that directs the emitted light to a sensitive (CMOS or CCD) camera. Precise control of the scanner (that "reads" the sample) and re-scanner (that "writes"the image on the camera) allows super-resolution imaging without closing the pinhole to a minimum. This highly photon-economical way of detection (no losses at the pinhole) and the use of a highly sensitive camera reduce the noise level in RCM images. Apart from imaging with better resolution and less noise the RCM microscope has a lot more potentional.

In the last few years we have exploited the possibilities of the RCM technology. We have adjusted the microscope for sequential and simultaneous multi-color imaging, FRET imaging, pH-imaging, ratio-imaging and FRAP measurements [2]. Recently, we added to this list deep-tissue imaging, SCIM-RCM (low-phototoxicity high-resolution imaging) [3,4], life-time imaging and other techniques to further improve the resolution. In this presentation we present our latest results.

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