

Super Resolution Imaging – Translation Microscopy (TRAM)

OVERVIEW

Heriot-Watt Institute of Biological Chemistry, Bio-Physics & Bioengineering (Edinburgh, Scotland) has developed a new technique, Translation Microscopy or TRAM, where super resolution images are recovered from low resolution image data. The TRAM technique is compatible with existing imaging & microscopy techniques and provides new levels of information on biological processes within a cell.

exploits new methods to restore high resolution super resolution images from low resolution data files.

PROBLEM THIS TECHNOLOGY SOLVES:

A method of using multiple low Resolution images to restore multi-colour super resolution images that are far beyond the diffraction limit (<40nm demonstrated).

TECHNOLOGY

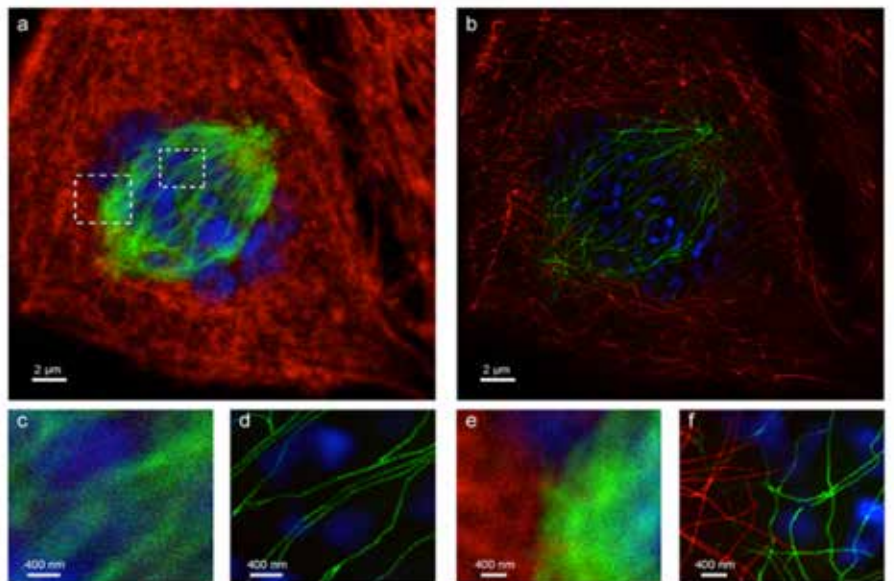
A problem within visual microscopy is that many “features of interest” are below the diffraction limit of the imaging system itself (~200nm for visible light) making studies on living cells, biological process or analysis of fine structure (e.g. porous rock in geology) challenging. Building on expertise in signal & data processing algorithms TRAM

Multi-colour TRAM images of a pulmonary endothelial cell. Three colours represent three different stained structures; Red: Actin, Green: Microtubules and Blue: DNA (DAPI), respectively.

(a) One of the many LR images acquired pre-processing.

(b) Super Resolution image restored using HWU TRAM process

c – f – expanded images of highlight regions within (a)



BENEFITS & APPLICATIONS:

- Super Resolution Image quality from Low Resolution Data
- Application to Fluorescence, Visible, IR microscopy data files etc.
- Complementary to existing microscopy techniques
- "wavelength Independent Processing" – broad application within imaging
- ~7x increase in lateral spatial resolution
- Potential application to Medical imaging e.g. X-ray, NMR etc.

STAGE OF DEVELOPMENT

"Proof of Concept" has been demonstrated on existing microscopes (e.g. Olympus IX81). This work is supported by further pending & granted patents in Wavefront Sensing & chromatic colour correction.

INTELLECTUAL PROPERTY STATUS

Patent Pending IPR - "A Super Resolution Restoration method" filed as a GB Priority filing (January 2013) protecting the method, software

code & algorithms. Proof of concept is demonstrated and a white paper planned for 2013.

Relevant Publication: due for publication in March 2013 – "Multi Colour Super Resolution Microscopy"

COMMERCIAL OPPORTUNITY

Heriot-Watt University seeks Life Science Companies; bio-photonics research groups; Optical Instrumentation & Microscope manufacturers and research scientists who see the potential applications of this technology within Life Sciences, cellular imaging and bio-chemistry.

Partners should have an interest in either obtaining a licence to develop this technology or to act as industrial sponsors to collaborate and provide financial (or "in-kind") support for technological developments in specific defined areas.

FOR FURTHER INFORMATION:

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