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# **Deep Tissue Optical Microscopy for Multi-Photon Microscope**

Tech ID: 25282 / UC Case 2013-662-0

#### **BACKGROUND**

Biological tissue is rarely transparent, presenting major challenges for deep tissue optical microscopy. Due to its high-resolution and viewing of live organisms, optical microscopy has become an important tool for biological research and continues to open new avenues in its capabilities. In recent years, image resolution and speed has dramatically improved. However, the resolution and penetration depth is still in great need of improvement. The problem is caused by light being absorbed, refracted and scattered as it passes through biological tissue, limiting the resolution and depth of optical imaging. Overcoming these challenges will benefit a wide range of applications from basic biological research to clinical investigations.

#### TECHNOLOGY DESCRIPTION

University of California, Santa Cruz researchers have demonstrated that imaging depth can be realized at depths beyond the reach of conventional geometric focusing and adaptive optics methods using interferometric focusing. Using this method over conventional geometric focusing of excitation light onto a guide-star embedded deeply in tissue, significantly increases its fluorescence intensity. The method can extend the depth of wavefront measurement and improve correction inside of tissues because of its ability to suppress both the scattering of diffused light and the aberration of ballistic light. Improvement more than doubles in sign-to-noise ratio of the guide-star through scattering tissue and the increase in intensity of ballistic light in the excitation path after wavefront correction.

#### **APPLICATIONS**

Deprical microscopy for both research and clinical applications, in fields such as neuroscience and developmental biology

# **ADVANTAGES**

► Significantly stronger optical resolution

# INTELLECTUAL PROPERTY INFORMATION

| Country                  | Туре          | Number    | Dated      | Case     |
|--------------------------|---------------|-----------|------------|----------|
| United States Of America | Issued Patent | 9,535,247 | 01/03/2017 | 2013-662 |
| United States Of America | Issued Patent | 9,360,428 | 06/07/2016 | 2013-662 |

# **RELATED MATERIALS**

Journal Publication: Live imaging using adaptive optics with fluorescent protein guide-stars - 06/28/2012

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# **INVENTORS**

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#### OTHER INFORMATION

#### **KEYWORDS**

Microscopy, deep tissue, guide-star,

multi-photon, optical resolution, deep

tissue optical microscopy,

neuroscience, developmental

biology, Cat2

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