



System For Fast Multi-Photon Imaging Using Spectrally Diffracted Excitation

Tech ID: 30285 / UC Case 2016-682-0

SUMMARY

UCLA researchers in the Department of Electrical Engineering have developed a new system for fast multi-photon imaging using spectrally diffracted excitation.

BACKGROUND

Multiphoton and laser scanning microscopy have enabled unprecedented dynamic exploration in living organisms. A significant challenge in biological research is the dynamic imaging of features within living organisms, which allows for real-time investigation of cellular structure and function. To make progress in our understanding of biological machinery, optical microscopes must be capable of rapid, targeted access deep within samples at high resolution. Additionally, these microscopy systems need rapid imaging rates to capture fast chemical and biological processes. Currently, systems with imaging rates in the range necessary to capture these events are not available because of physical technical limitations.

INNOVATION

UCLA Prof. Bahram Jalali and colleagues have developed a system for fast multi-photon and laser scanning microscopy that allows for investigation of chemical and biological reactions in the 1-40 kHz range. They developed a novel system that avoids the mechanical restrictions currently limiting the imaging rates, by employing a system that uses a novel diffraction grating combined with a rapid wavelength swept laser.

APPLICATIONS

- Fluorescence lifetime, two-photon, and multi-photon imaging microscopy
- Applied to fiber endoscopes for potential clinical applications

ADVANTAGES

- Order of magnitude improvement in non-linear imaging speeds
- Fiber-based setup
- Longer wavelength laser allows for deeper imaging depth
- Fast imaging rates are achieved by passive methods allowing for more reliable and compact systems

STATE OF DEVELOPMENT

Researchers have implemented this technology to image various pollen and Rhodamine-6G samples.

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,009,459	05/18/2021	2016-682

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INVENTORS

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OTHER INFORMATION

KEYWORDS

microscopy, two-photon, two-photon microscopy, multi-photon microscopy, TPEF, fluorescence lifetime imaging, diffraction-grating, FLIM

CATEGORIZED AS

- **Optics and Photonics**
 - All Optics and Photonics
- **Imaging**
 - Other
- **Research Tools**
 - Other
- **Sensors & Instrumentation**
 - Scientific/Research

RELATED CASES

2016-682-0

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