



Multidimensional Imaging with Improved Contrast

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WARF: P140021US02

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a new method to provide chemically selective, multidimensional images of various types of chemical and biological samples.

Overview

Studying molecular properties in complex chemical and biological samples, including live cells, requires sufficient spatial resolution and contrast between different substructures. To achieve enhanced contrast, certain spectroscopic techniques such as coherent anti-Stokes Raman scattering (CARS) microscopy use vibrational spectroscopy where the contrast depends on the chemical identity of sample substructures. The contrast of these methods is one dimensional and is limited by the spectral congestion characteristic of complex materials.

The Invention

UW–Madison researchers have developed a new coherent multidimensional spectroscopy (CMDS) technique that enhances the image contrast by using multiple frequencies that provide 3-D contrast. The method uses three coherent light pulses (intense light beams) with three different frequencies to interact with multiple functionalities within the molecules (e.g., C-H bonds) to create coherent images that are highly characteristic of specific molecules within sample substructures.

Applications

- Multidimensional (2-D or 3-D) sample imaging
- Relevant in myriad fields, including membrane biology, neurobiology, pathology, pharmacology and materials science

Key Benefits

- Improves image contrast
- Enhances signal strength by up to seven orders of magnitude
- Suppresses background interference
- Unlike existing techniques (e.g., CARS) the new method probes both the vibrational and electronic characteristics of molecules to better study and identify them.
- Increases interrogation spot size

Stage of Development

The capabilities of the new method were demonstrated using a number of model chemical systems.

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For More Information About the Inventors

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Related Technologies

- [WARF reference number P04405US describes a nonlinear spectroscopic method and device for analyzing interactions between two molecules, such as a drug and a potential protein target.](#)

Tech Fields

- [Analytical Instrumentation, Methods & Materials : Microscopy.](#)
- [Analytical Instrumentation, Methods & Materials : Spectroscopy.](#)

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867

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