AzTE Arizona Technology Enterprises

www.azte.com

Dynamically Formed Rotors for Lock-In Amplifier Detection

AzTE Case #M03-002

Inventors

Dr.Antonio A. Garciai
Associate Professor
Department of Bioengineering,
Arizona State University

Dr.Anil Vuppu
Asst. Research Scientist
Department of Bioengineering,
Arizona State University

Dr.Mark Hayes
Associate Professor
Department of Chemistry,
Arizona State University

Dr. Karl Booksh
Assistant Professor
Department of Chemistry
Arizona State University

Intellectual Property Status

Issued Patent
US 6,852,547

Contact

Bill Loux
Director of Business Development
Arizona Technology Enterprises, LLC (AzTE)
480.884.1996 main
480.884.1992 desk
Email: bloux@azte.com

Background

Lock in Amplifiers can extract signals from extremely noisy environments. This property can be put to use in improving the detection of signals in micro channels. In effect there is improvement in the signal to noise ratio hence increasing detection sensitivity in environmental and biological tests in miniaturized systems. There have are several techniques to measure signals in nano-scale volumes but the challenge always lied in the accuracy of the signal and filtering the background noise. Accurate and noise free signal will boost the Signal to noise ratio and also help avoid false reading.

Invention Description

Researchers at Arizona State University have developed a novel technique to measure low levels of a substance in a sample. This invention demonstrates a method to dynamically form, rotate and detect signals from 3D structures in micro channels. Fluorescence is a very useful signal that can be monitored from a spinning rotor. This technique helps to detect signals like fluorescence within the micro channel. Using the principle of Lock in Amplifier this discovery greatly boosts the signal to noise ratio. A Lock in Amplifier is widely used to measure the amplitude and phase of signals buried in noise. The noise from the surface of the particles in the spinning rotor is filtered out using the lock in amplifier. The phenomenon is based on spinning rotors formed by patterning using rotating magnetic field.

Potential Applications

- **Microfluidics**
- **Chemical detectors**, **Biological contamination detection**
- **Chemical and bio-warfare agent monitoring**
- **In Vitro Diagnostics**
- **Astronomy**

Benefits and Advantages

- **Boost in Signal to noise ratio**
- **Detection within nanolitre to sub-nanolitre scale volume**
- **Minimize false reading by expanding data range while filtering background noise**