Quaternary Mass Labeling System

A highly sensitive mass spectrometry and quaternary mass labeling system enables the detection of rare molecules and cells for advanced chemical analysis and disease diagnostics, surpassing the effectiveness of standard affinity assays.

The detection of rare molecules in a small sample is a difficult task. Detecting rare molecules with occurrence of once in a femtomolar or less cannot be achieved by standard affinity assays because the required number of molecular copies is greater than those found for rare molecules. For example, an immunoassay is a method for detecting specific proteins that identify certain antigens and antibodies with a usual detection limit of one picometer, which is one thousand times higher than a femtomolar. This required range is much higher than that of a rare molecule; improvements are needed in heightening the sensitivity of methods for detecting molecules.

Researchers at Purdue University have developed a method using mass spectrometry and a quaternary structure as a basis for rare molecule detection. By utilizing a process that involves a quaternary mass labeling system, labels are attached to an affinity reagent or a rare molecule. Because the bonding partners of affinity agents are specific to certain molecules, a mass spectrum analysis of the quaternary mass label is able to determine the presence of each mass label. This process can also be used in searching for rare cells in patients for diagnosis of various diseases including cancer.

Advantages:

-Can detect molecules at rarer concentrations

-More effective than affinity assays

-Chemistry and medical uses

Potential Applications:

-Chemical analysis

Technology ID

2016-COOK-67396

Category

Biotechnology & Life Sciences/Biomarker Discovery & Diagnostics

Chemicals & Advanced Materials/Specialty & Performance Chemicals

Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

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View online

-Disease diagnostics

TRL: 3

Intellectual Property:

Provisional-Patent, 2016-01-22, United States | EP-Patent, 2017-01-20, France | EP-Patent, 2017-01-20, United Kingdom | EP-Patent, 2017-01-20, Germany | PCT-Patent, 2017-01-20, WO | NATL-Patent, 2018-07-20, Canada | NATL-Patent, 2018-07-20, Japan | NATL-Patent, 2018-07-20, Europe | NATL-Patent, 2018-07-20, United States | NATL-Patent, 2018-07-23, Brazil | NATL-Patent, 2018-08-17, Republic of Korea | NATL-Patent, 2018-09-18, China | CON-Patent, 2021-06-09, United States | DIV-Patent, 2021-10-11, China | DIV-Patent, 2021-10-21, Japan | CON-Patent, 2024-06-21, United States | DIV-Patent, N/A, Europe

Keywords: Rare molecule detection, mass spectrometry, quaternary structure, quaternary mass labeling, affinity reagent, affinity assays, disease diagnostics, chemical analysis, cancer diagnosis, high sensitivity detection, Chemistry and Chemical Analysis, Mass Spectrometry, Medical Diagnostics, Medical/Health, RNA