Ionizable Isotopic Labeling Reagents for Relative Quantification by Mass Spectrometry

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing small, inexpensive ionizable tags for relative quantification in mass spectroscopy.

OVERVIEW

Mass spectroscopy is a widely used technique for detecting and analyzing molecules, including biochemical entities such as amino acids, proteins, short nucleic acids, metabolites and other small molecules. To use mass spectroscopy to provide information about the relative quantification of metabolites and other molecules, the molecules must be labeled. But existing tags are expensive and useful only in limited situations.

THE INVENTION

UW-Madison researchers have developed small, inexpensive ionizable tags for non-targeted relative quantification of a variety of biological metabolites, peptides and proteins by liquid chromatography-mass spectrometry (LC-MS). The tags differ in their isotopic composition and react quantitatively with amines or carboxylic acid groups, offering a powerful approach to relative quantification of multiple analytes between two samples by electrospray ionization-mass spectrometry (ESI-MS).

One sample is labeled with an isotopically-light reagent and the other sample is labeled with an isotopically-heavy reagent, which yields a characteristic mass shift in the spectra. The relative intensity for each peak pair allows for the precise determination of the relative concentration of multiple analytes between samples. In addition, these reagents enhance the ionizability of the analytes in positive-ion mode MS, resulting in lower detection limits.

APPLICATIONS

- Labeling any molecule with a free amine or carboxylic acid group, including metabolites, amino acids, peptides and proteins

THE WARF ADVANTAGE

Since its founding in 1925 as the patenting and licensing organization for the University of Wisconsin-Madison, WARF has been working with business and industry to transform university research into products that benefit society. WARF intellectual property managers and licensing staff members are leaders in the field of university-based technology transfer. They are familiar with the intricacies of patenting, have worked with researchers in relevant disciplines, understand industries and markets, and have negotiated innovative licensing strategies to meet the individual needs of business clients.

KEY BENEFITS

- Improves the precision of relative quantification by minimizing run-to-run variability. Precision is comparable to gas chromatography-mass spectrometry (GC-MS) methods and is superior to conventional LC-MS methods
- Labeling enhances ionizability in positive-ion mode MS and lowers detection limits.
- Labeled products can be analyzed in a single run because amine labeling reagents yield a two Da shift between light- and heavy-labeled products whereas carboxylic acid labeling reagents yield a nine Da shift.
- Labeling signifies the presence of specific functional groups, which helps identify unknown compounds
- Light- and heavy-labeled analytes co-elute in both reverse-phase (RP-HPLC) and hydrophilic interaction chromatography (HILIC)
- Reaction products require no purification before LC-MS analysis
- Acid-labeling increases the charge state of peptides resulting in improved electron-transfer dissociation (ETD)

ADDITIONAL INFORMATION

Tech Fields

Research Tools - Detection

Analytical Instrumentation - Mass spectrometry

CONTACT INFORMATION

For current licensing status, please contact Jennifer Gottwald at jennifer@warf.org or 608-960-9854.