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Glycan and Biopolymer Analysis by Two-Dimensional Tandem Mass Spectrometry

A new mass spectrometry method rapidly identifies components in mixtures of biopolymers or industrial polymers without requiring complex sample preparation or iterative searching.

Researchers at Purdue University have developed a mass spectrometry (MS) method to identify biopolymers or industrial polymers in a mixture. With current mass spectrometry methods, analysis of mixtures of biopolymers requires first enzymatic and/or chemical degradation of the full-length biopolymer followed by separation and purification steps prior to MS/MS that make the process time consuming. Mass by charge (m/z) values must also be specified, sometimes requiring multiple iterations to obtain the correct value. The Purdue researchers' method does not require specification of specific m/z values; it uses a preliminary dissociation step to lower the detected m/z values. Precursor and product m/z values are then detected with tandem MS/MS, allowing the researchers to "build up" the structures of the molecules in the mixture. Combined, the dissociation and MS/MS scanning steps take approximately two seconds to complete.

Technology Validation: The Purdue researchers successfully identified the four glycan components in a Pneumococcal disease vaccine.

Advantages:

-Fast

-Does not require iterative search of appropriate m/z

-Ability to analyze a range of biopolymers or polysaccharides

-No special equipment needed; can be done on available commercial mass spectrometers.

Applications:

-Structural identification of biopolymers or glycan components of vaccines

Technology ID

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Category

Chemicals & Advanced Materials/Polymer Science & Smart Materials

Biotechnology & Life Sciences/Analytical & Diagnostic Instrumentation

Authors

Robert Graham Cooks

Dylan Holden

Kiran Iyer

MyPhuong Le

Jeremy Manheim

Further information

Dipak Narula

dnarula@prf.org

View online

-Identification of components in a mixture of industrial polymers or biopolymers

TRL: 4

Intellectual Property:

Provisional-Patent, 2022-09-06, United States | NATL-Patent, 2023-08-23, Europe | NATL-Patent, 2023-08-30, Canada | PCT-Patent, 2023-08-30, WO | NATL-Patent, 2025-03-05, United States

Keywords: mass spectrometry, MS/MS, biopolymers, industrial polymers, glycan components, polysaccharide analysis, structural identification, mixture analysis, fast analysis, commercial mass spectrometers, 2D MS/MS, Chemistry and Chemical Analysis, Complex mixture analysis, Glycan, Mass Spectrometry, MS/MS, Pneumococcus, Polysaccharides, Tandem Mass Spectrometry, Vaccines