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Battelle Number(s):

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Patent(s) Issued

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Available Technologies

Surface Induced Dissociation (SID) for Enhanced Sequencing of Complex Molecules

SUMMARY

Analysis of large complex biomolecules is one of the primary applications of mass spectrometry. Tandem mass spectrometry (MS/MS) is frequently employed in this process to provide backbone structural information through fragmentation of ionized molecules in the gas phase. In a typical MS/MS experiment, an ion is mass selected in a first ionization step, activated by collision or photon energy, and the subsequent decay into fragment ions is analyzed in a second MS step.

For large biomolecules, effective fragmentation using traditional methods is limited by two fundamental limitations: 1) center of mass collision energy decreases with increasing mass of the parent ion, and 2) the density of states within a molecule increases with increasing mass. Although various techniques have been employed to overcome these barriers to fragmentation, none has proven to be very effective and/or simple to implement. The SID technique developed at PNNL induces fragmentation of biomolecules via a single collision of a molecule with a surface. While not necessarily a substitute for conventional fragmentation methods, experiments at PNNL have demonstrated that SID can provide information on biomolecule backbone structures that is supplementary and complementary to traditional methods.

Implementation of an SID capability within a mass spectrometer system is relatively simple, involving the installation of an SID target within a vacuum chamber of the instrument. Ideally, the target should be composed of a relatively rigid material to maximize fragmentation. The preferred surface in the PNNL technique is a diamond surface, which in addition to enhancing fragmentation, is extremely durable and should not need to be changed out frequently.

U.S. DEPARTMENT OF ENERGY

Patents & Intellectual Property

» Patent #: 7,365,312

Technology Portfolio(s)

» Mass Spectrometry Instrumentation

Potential Industry Applications

» Chemicals

» Healthcare, Pharma, Biotech & Medical

» Professional Services

» Security

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