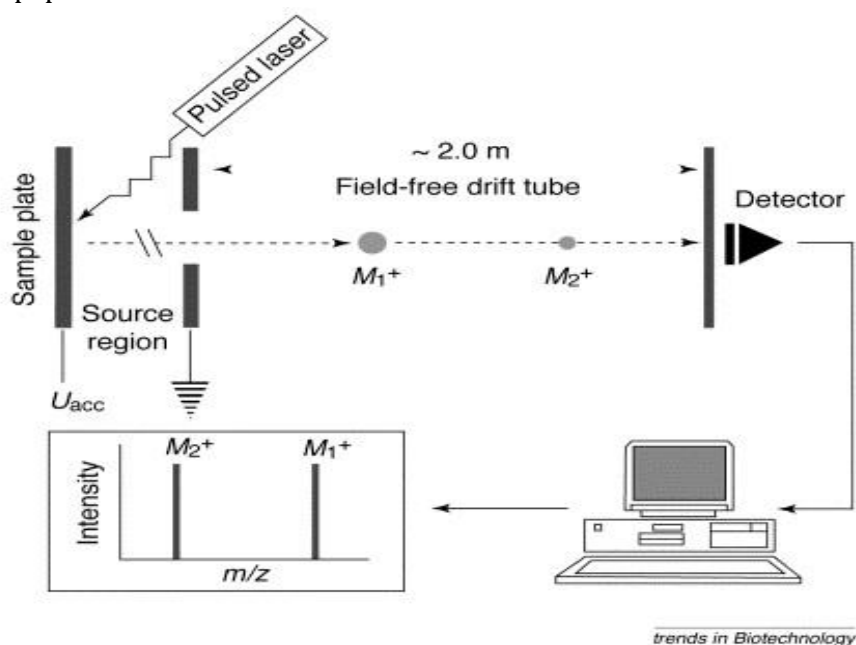


How Does Matrix-Assisted Laser Desorption/Ionization-Time of Flight Mass Spectrometry Work?

Mass spectrometry is a technique used to identify a molecule and determine its chemical structure by analyzing the mass and the charge of its ion fragments. Matrix-assisted laser desorption/ionization time of flight mass spectrometry (MALDI-TOF) is a very sensitive technique used to determine the mass of polymers, proteins or peptides.



Typically in the MALDI-TOF process, the sample to be analyzed is mixed with another compound, called a matrix. The mixture is applied to a target slide, placed inside the instrument, and irradiated with a laser. The matrix absorbs the laser light and vaporizes, along with the sample, in the process gaining an electrical charge (ionization). Electric fields then guide the ions into the flight tube, which separates them according to 'weight' (mass) and displays the results as a series of lines (spectrum) which correspond to different fragments that have broken away from the original molecule. By analyzing the pattern of fragments it is possible to deduce the

structure of the molecule.

Matrix-assisted laser desorption/ionization time of flight mass spectrometry is used for the characterization of backbone and end group functionality of polymers. The weight (mass) of the end group polymers can be obtained from MALDI-TOF data. Sequence data for polymers and copolymers can also be generated using MALDI-TOF analysis. The high specificity of the data obtained using MALDI-TOF can provide information about end-group functionality and copolymer sequencing that is not available by other analytical techniques. MALDI can be used to determine the molar mass distribution or degree of polymerization of extended polymers that would fracture if ionized by conventional means. Because polymers with the same composition but differing degrees of polymerization often have different properties (for instance, higher tensile strength and higher melting point), identifying the molar mass distribution of a polymer is of great interest to polymer chemists. MALDI (Matrix-Assisted Laser Desorption/Ionization) is an incredibly powerful analytical technique that allows for the "soft ionization" (i.e. ionization without fragmentation) of compounds, a procedure that is especially useful for analyzing macromolecules that would be fragmented by other methods. Specific combinations of matrix compounds, lasers, and mass spectrometers allow for the technique to be tuned for analysis of specific compounds.