

"New Instrumentation and applications of FTICR mass spectrometers and Electron Capture Dissociation"

Abstract:

The Boston University School of Medicine's FTICR mass spectrometry group has been working to develop a new Cryogenic FTICR mass spectrometer, in which the mass spectrometer is fully integrated with the 14 Tesla superconducting electromagnet. This requires that the mass spectrometer operate at 4K, without generating too high a heat load on the liquid helium dewar. The engineering challenges were substantial, but have largely been solved resulting in the recent publication of first spectra from this unique instrument. When fully developed, this instrument offers the potential for high field FTICR mass spectrometry at a fraction of the current cost, while also providing an ideal, low noise environment for detection.

Additionally, ECD has been developed for glycan analysis and detection of common post translational modification products of proteins, such as isoaspartic acid. Applications of these "isoaspartic" studies in anthrax vaccine stability, antibody structural variance, amyloid protein aggregation, and general proteomics are being explored. Finally, a substantial number of fundamental experiments into the nature of the ECD process have been performed which reveal the existence of numerous secondary free-radical based rearrangements during ECD. These rearrangements have been partially characterized in terms of their thermodynamics and kinetics.