

Reference: Asiri S. Galhena *et al.* "Surface-Induced Dissociation of Peptides and Protein Complexes in a Quadrupole/Time-of-Flight Mass Spectrometer", *Analytical Chemistry*, 2008, 80, 1425-1436.

Bioanalysis and Sample: In this paper, the authors describe a novel ion activation method--- surface-induced dissociation (SID), which is implemented in a commercial Quadrupole/Time-of-Flight (QTOF) instrument together with collision-induced dissociation (CID). This instrument is applied to get the MS/MS spectra of various peptides and a noncovalent protein complex. Then the SID spectra are compared with the CID spectra in the same instrument.

Importance: CID is the most widely used ion activation method. However there is some limitation when it is used to dissociate large and complex biological molecules. Contrarily, SID has higher mass of the surface which is capable of higher internal energy deposition. Thus the accessibility to high energy fragmentation is increased. SID also causes charge reduction which is useful to identify multiple charged peptides. Based on its narrow and easily controlled internal energy distribution in ions, activated by surface collisions, SID is a better method for isomer distinction.

Technique: SID is derived from the conversion of translational to internal energy during ionic collisions at surfaces. The target surface is considered as its collision target. The fluorinated self-assembled monolayer (SAM), which provides minimal neutralization and efficient projectile internal energy deposition, is recently used extensively. In this paper, SAM surfaces composed of well-ordered fluorinated alkanethiolates on gold is used to be the target. The authors integrate a SID unit into a commercial QTOF instrument. This in-line SID device has two modes, one is SID and the other one is CID or MS operation which is shifted through different voltage. This design facilitates comparison between the two ion activation methods. And ultimately some peptides and one noncovalent protein complex are analyzed by the instrument above.

Example: The SID MS/MS spectrum for peptide YGGFL (A) is similar with CID spectrum. A higher intensity in blue-circle area (immonium ions) in SID spectrum suggests its advantage in higher energy fragmentation. The spectrum (B) for doubly protonated peptides shows SID can reduce charge while CID cannot.

Opinion: The paper validates the SID is a valid substitute for CID in a Q/TOF instrument to analyze the peptides and noncovalent protein complex. In general, the mass spectrum patterns are similar. However, SID converts more translational energy to internal energy, which provides SID a potential advantage to analyze large peptides, intact protein and so on. And another property charge reduction renders SID a complementary tool to identify multiply charged projectile ions. Nevertheless, the application of SID as a routine and effective activation method in commercial mass spectrometers has not yet been realized.

