THE IMPLEMENTATION AND CHARACTERIZATION OF ELECTRON TRANSFER DISSOCIATION (ETD) ON AN ION MOBILITY ENABLED Q-TOF MASS SPECTROMETER

K. Compson[(1)], I. Campuzano[(1)], J. Brown[(1)], J.P. Williams[(1)], J. Langridge[(1)].

[(1)] Waters Corporation, Simonsway

ETD can be implemented and performed on a hybrid Q-IMS-TOF (Waters Synapt G2) where a supply of reagent is delivered to the nano ESI source and a high voltage discharge pin generates the reagent anions. Analyte cations are generated by infusion or from a nanoACQUITY UPLC system. For ETD, the ion source polarity and the quadrupole set mass are sequentially switched to deliver anions and cations into the TRAP travelling wave (TWAVE) ion guide where they interact to form ETD product ions. Product ions are optionally separated by ion mobility in the IMS TWAVE ion guide or are accelerated into the TRANSFER TWAVE ion guide to cause 2nd generation CID ions prior to mass analysis in the TOF. New software that uses both a survey scan and charge state recognition can alternatively decide to perform ETD in the TRAP TWAVE for the higher charge states or CID in the TRANSFER TWAVE for the lower ones. Phosphopeptides from UPLC separated digests of alpha and beta Casein are shown where cleavage was observed at almost every N-alphaC bond in the peptide backbone, yielding easy-to-interpret sequence ladders of c and z-ions. The use of supplemental activation by CID to enhance ETD product ion yield is shown to good effect on one of the more robust beta casein phosphopeptides. This coupled with the inherent mass measurement accuracy and resolution of the oa-TOF mass analyser makes the data amenable to de novo sequencing. Examples of top down sequencing using ETD from protein mixtures separated on a 75 micron Symmetry C4 column with the nanoAcquity are also shown.