

# Improved Qualitative and Quantitative Analysis of Natural Organic Matter by On-Line Liquid Chromatography Coupled to 7T FT-ICR Mass Spectrometer Equipped with Quadrupolar Detection

DONGHWI KIM<sup>1,2</sup>, SUNGHWAN KIM<sup>1,3</sup>

<sup>1</sup>Department of Chemistry, Kyungpook National University, Daegu 41566, Republic of Korea

<sup>2</sup>Analytical Research Center, Korea Institute of Toxicology, Daejeon 34114, Republic of Korea

<sup>3</sup>Green-Nano Materials Research Center, Daegu 41566, Republic of Korea

Fourier transform ion cyclotron resonance mass spectrometry (FT-ICR MS), combined with quadrupolar detection (QPD) is a powerful tool to obtain natural organic matter (NOM) in the river and ocean. In this study, the technique was combined with on-line liquid chromatography (LC) MS to study NOM. Even though Fourier transform ion cyclotron resonance (FT-ICR) is an important analytical technique to study natural organic matter (NOM) at the molecular level, previous reports on on-line LC FT-ICR MS analysis of NOM have been limited. The limitation occurred from the fact that long acquisition is required to obtain high resolution mass spectra by use of FT-ICR MS. In this study, FT-ICR MS equipped with quadrupolar detection (QPD) was applied for on-line LC-MS analysis of NOM. The QPD technique enabled us to shorten the acquisition time without sacrificing the spectral resolving power. On-line LC QPD FT-ICR MS spectra of NOM was observed with the resolving power of 320,000 at  $m/z$  400 in 1.3 s acquisition time and 170,000 in 0.8 s. Compared to data obtained by LC FT-ICR MS with dipolar detection, improved signal to noise ratios and 40 % increase in dynamic range were observed when the same resolving power was maintained. Significant proportions of uniquely detected compounds in LC QPD FT-ICR MS were identified as NIO<sub>x</sub> and SIO<sub>x</sub> class compounds. This study demonstrates that QPD LC FT-ICR MS has a good potential for the screening of low abundance analytes and can provide more comprehensive information of NOM.