

# Development of gas-phase pre-separation tools for higher sensitivity in the molecular characterization of biodiesel mixtures *by*

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Abstract ID: 20

## Abstract Details

The analysis of complex mixtures without pre-fractionation is analytically challenged by the high number of chemical components and their wide concentration range. In addition, many chemical species are difficult to ionize and charge competition may occur prior to mass analyses, thus limiting the detection capabilities of any analytical instrument. In the present work, we show the advantages of gas-phase separation prior to high resolution mass spectrometry analysis. In particular, two biodiesel fuel standards (soy and animal based) were analyzed using a novel analytical method featuring gas chromatographic separation prior to atmospheric pressure laser ionization (APLI). Results showed that gas- phase separation allows for 57 % and 39 % increases in the number of compounds detected from the soy-based and animal-based samples, respectively, when compared with direct infusion. Results also suggest that the molecular ion signal increase is achieved through the reduction of the ion suppression within the plume of the spray- based atmospheric pressure ionization sources (also valid for ESI, APCI, APPI sources). Accurate mass measurements ( $< 0.5$  ppm) via Fourier Transform Ion Cyclotron Resonance Mass Spectrometry (FT-ICR-MS) enabled unambiguous identification of over 2,000 molecular ions per sample in the  $m/z=150-550$  range. Inspection of the Kendrick and van Krevelen plots revealed that ion suppression when using APLI appears to be mostly concentration dependent regardless of the chemical class; that is, it does not depend on aromaticity, polarizability, or mass range.

## Event Information

Event: FIU Undergraduate Research Conference

Topic: Chemistry

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