# Application Snapshot

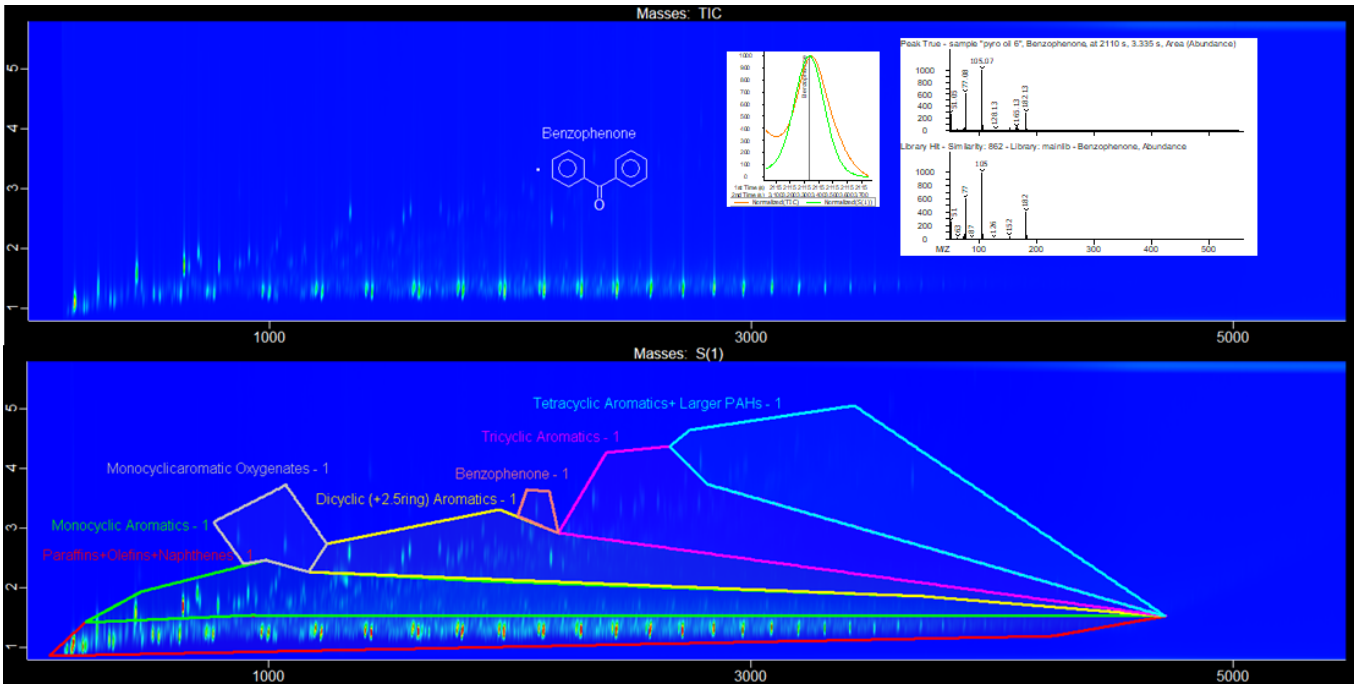
EMPOWERING RESULTS
*Elemental Analysis | GC Mass Spectrometry | Metallography*

## *Instrument: Pegasus® BT 4D with Paradigm™ Shift™*

# Dual-Detection of Plastics-Derived Pyrolysis Oil

*LECO Corporation; Saint Joseph, Michigan USA*

Key Words: : Plastics, Pyrolysis Oil, Dual-Detection, Petroleum Alternative




***(Top) Total ion chromatogram of plastic-derived pyrolysis oil is shown on a contour plot. A zoomed-in portion of the aligned linear traces for TIC and the FID S(1) trace are shown along with the NIST-library matched spectra for the selected benzophenone peak. (Bottom) The FID signal is plotted with group-type classification region boundaries drawn.***

Simultaneous acquisition of qualitative and quantitative data in one injection of a polypropylene- and polyethylene-derived pyrolysis oil is made possible with detailed component identification from the time-of-flight mass spectra and group-type area % classification of the FID provided by the LECO *Pegasus* BT4D with *Paradigm Shift* flow modulator and splitter system.

TOFMS detection informs proper group-type boundary delineation and identifies analytes that are of particular import for product quality like species with heteroatoms. The novel constant-split ratio of the *Shift* flow splitter allows labs to take advantage of added TOFMS chemical information without sacrificing quantitative accuracy of the GCxGC-FID data.

| **Gas Chromatograph** | **Agilent 8890 with LECO *Paradigm* Flow Modulator** |
|---|---|
| Injection | 0.5 µL liquid injection, split 400 @ 320°C |
| Carrier Gas | Hydrogen, Corrected Constant Flow |
| | Primary Column Flow Rate: 0.5 mL/min |
| | Secondary Column Flow Rate: 32 mL/min |
| Primary Column | Rxi-1MS 20 m x 0.18 mm x 0.18 µm coating (Restek) |
| Secondary Column | Rxi-17SilMS 3.35 m x 0.25 mm x 0.25 µm coating (Restek) |
| Temperature Program | 35°C held for 3.0 min, ramped 4.3°C/min to 350°C and held for 15.0 min |
| Modulation | 5.0 s; 0.161 s injection duration |