The Complete Solution for Plastic and Polymer Identification and Analysis
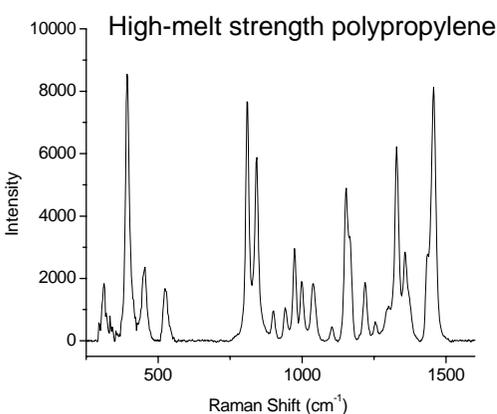
Dimension-P1™ and RamanSoft™ provide the sensitivity, resolution, and background removal algorithms required for rapid and clear analysis of plastic products and polymers. The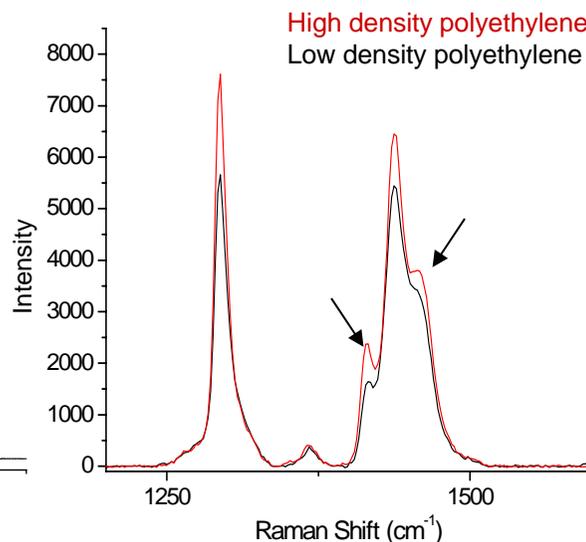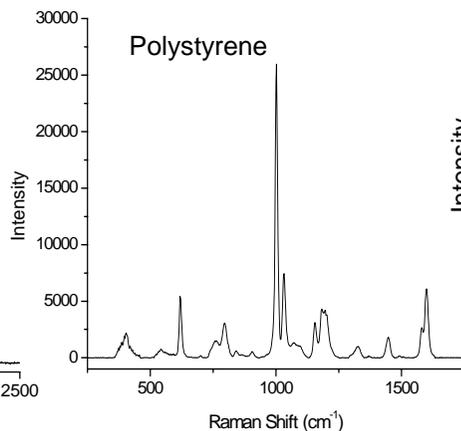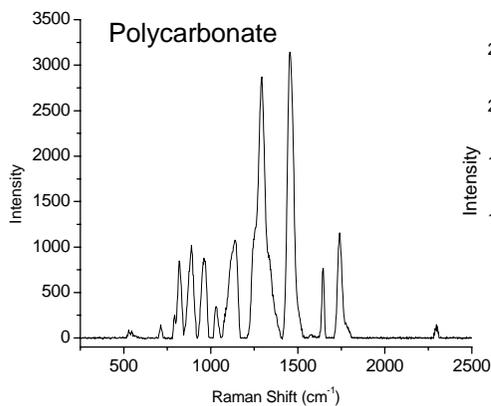 versatile external sample cell and LSI Vector Raman Probe™ make a wide range of sample types accessible for analysis including bulk plastics such as the polystyrene, polypropylene, polycarbonate, and polyethylene shown here. Shown below is an expanded spectral comparison of high and low density polyethylene illustrating the difference in the Raman signals between these two polymer forms.

High-melt strength polypropylene

Polycarbonate

Polystyrene

High density polyethylene
Low density polyethylene

n-Methylpyrrolidone
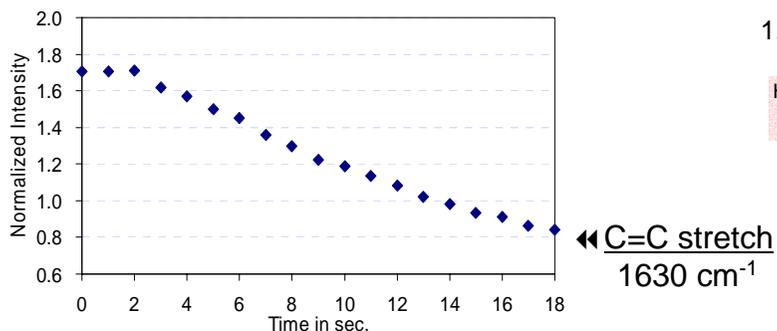

10% Aqueous N-Methyl Pyrrolidone
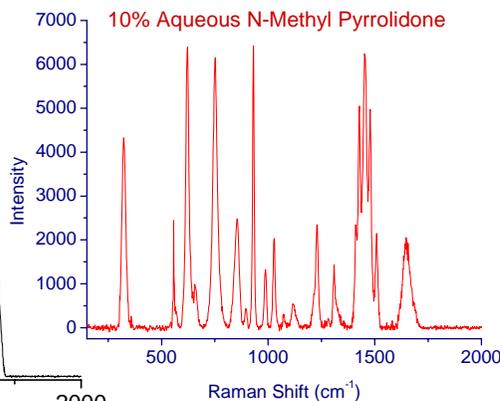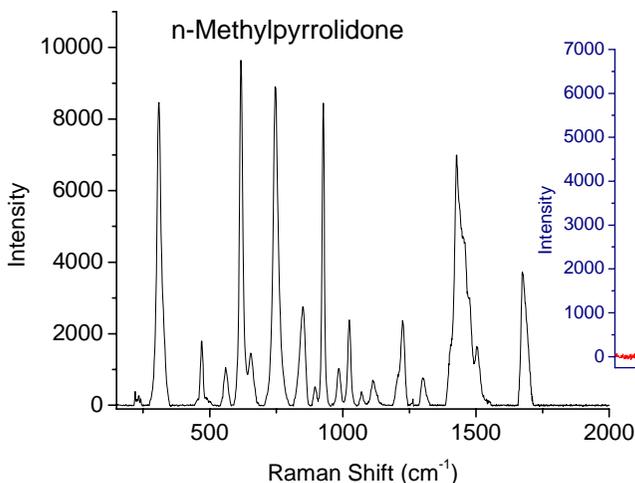
NMP is a widely used solvent for the synthesis of plastics, resins, and paints. It dissolves polymers, such as polyamides, polyesters, polystyrene, and polyvinyl chloride. Its analysis is critical for the co-determination of dissolved compounds, control of trace contaminants and for monitoring its removal during processing and disposal. The spectra on the left illustrate the 1-second spectra of NMP and 10% aqueous NMP Water, which would make FTIR analysis of NMP difficult or impossible, poses little problem for the Dimension-P1™ and RamanSoft™.

TiO$_2$

1C$_7$, **2**C$_{11}$ Phthalate ester

PVC-based roofing material
PVC powder
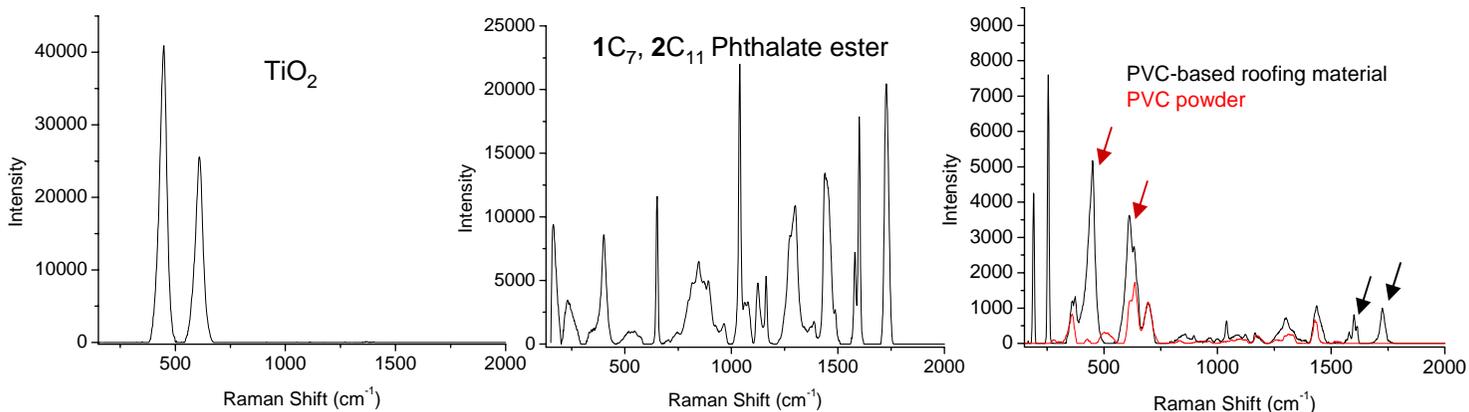
Phthalate esters and pigments are common additives for PVC based materials and are thus critical for defining the properties and integrity of these materials. The C$_7$, C$_{11}$ ester and TiO$_2$ shown above are widely used in roofing material, above right; the overlaid spectra of PVC and commercial roofing material on the right are normalized at 695 cm^{-1} to enable comparison and it shows how peaks from additives such as phthalates (black arrows) and TiO$_2$ (red arrows) can be identified and distinguished from PVC alone. The phthalate and TiO$_2$ spectra were acquired in glass vials; the roof sample spectrum was obtained using the external sampling module placed directly on the roofing material.

The Dimension-P1^{TM} Raman System and RamanSoft^{TM} give the user easy access to the Real-Time Monitoring functionality. The monitoring of UV-induced polymerization of 1,6-hexanediol diacrylate is shown below as the decrease in the H$_2$C=CH peak at 1630 cm^{-1}, thus permitting critical process analysis.

Real-time Raman

◀◀ C=C stretch
1630 cm^{-1}
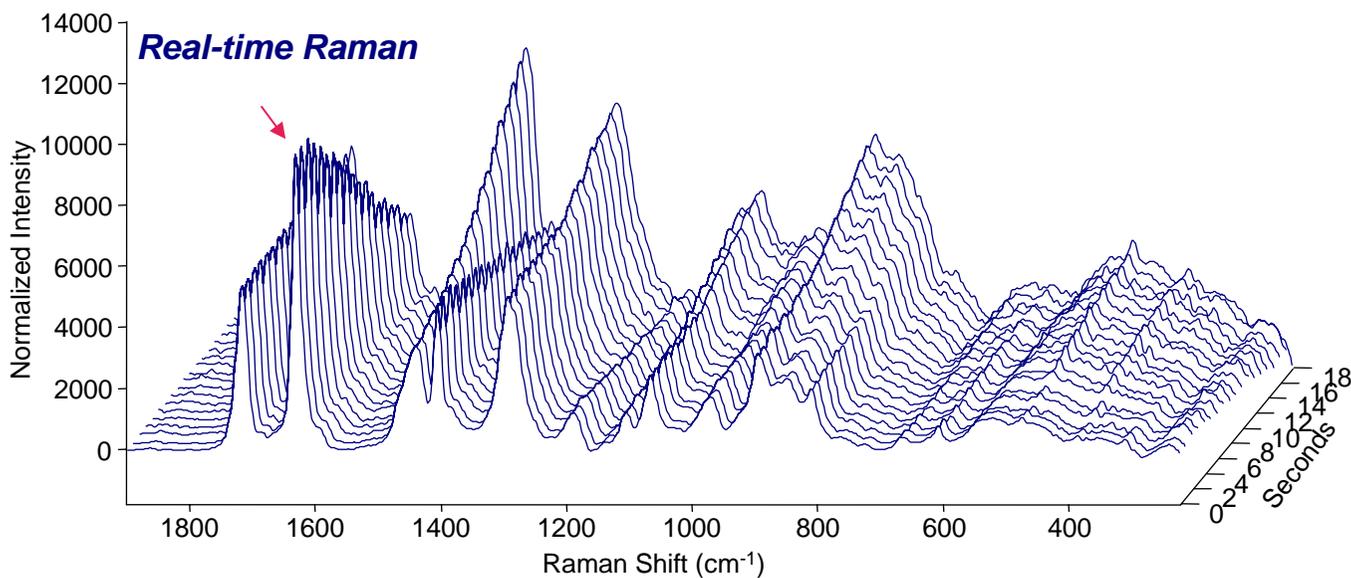
1,6-hexanediol diacrylate/Irgacure 369

$$H_2C=CH-C-O-(CH_2)_6-O-C-CH=CH_2$$
$$\quad\quad\quad\; O \quad\quad\quad\quad\quad\quad\quad\quad O$$

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