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ANALYSIS OF POLYMER PLASTICS BY FOURIER TRANSFORM
INFRARED MICROSCOPY*

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**ANALYSIS OF POLYMER PLASTICS BY FOURIER TRANSFORM
INFRARED MICROSCOPY***

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Researchers in the Energy Systems Division at Argonne National Laboratory have developed technologies to recover the plastic and foam materials from automobile shredder recycling and are looking for alternatives to landfill disposal. Characterization of the polymer plastics obtained from recycling is an important aspect of this program. In this work, polymer plastics from the recycling process were analyzed by Fourier transform infrared (FTIR) microscopy. Preparation of the polymer sample is critical to the analysis since very thin films of the bulk polymer are required to obtain usable IR spectra.

Analytical samples were prepared by cutting off a small section of the polymer sample and then flattening this piece into a thin film by using a roller knife. The thin polymer films were then placed on potassium bromide disks. This procedure was done using an Olympus stereo-zoom microscope. A Spectra-Tech IR microscope with video image capability was used to adjust the field of view of the analytical sample to approximately 100 μm . The thickness of the polymer films was minimized to obtain proper light transmission and reduced scattering.

The transmission infrared spectrum of each sample was obtained using a Nicolet Magna FTIR 750 spectrometer. The polymer samples were qualitatively analyzed by comparing the sample spectra obtained to those recorded in the Hummel Polymer Library (Figs. 1 and 2). The samples were identified as polyethylene, polypropylene, polystyrene-acrylonitrile, polyvinyl chloride, and poly(styrene:methylmethacrylate:acrylonitrile). (Work supported by the U.S. Army and the U.S. Department of Energy under Contract W-31-109-ENG-38.)

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Fig. 1. Thin Film: FTIR Microscopy

Fig. 2. Reference Spectrum: Hummel Polymer Library