

GRAINGER FASHION COLLECTIONS

Identifying materials innovation across generations

POLYMUSE and the Grainger Collection

Contrary to the current discourse on the persistence of plastics in our environment, modern polymers (more commonly referred to as plastics) in museum collections have been observed to deteriorate more rapidly than many natural materials. The POLYMUSE project, an Australian Research Council funded collaboration between Australian museum professionals, collections and scientists aims to develop methods for predicting and extending the lifespan of plastic or polymer-based materials in museum collections. Key to enabling these outcomes is the accurate identification of modern polymeric materials present in cultural collections. As part of this project, the Grainger Museum's collection of garments were selectively surveyed to identify the presence of plastics and modern polymers and evaluate their condition.

Identification of modern polymers

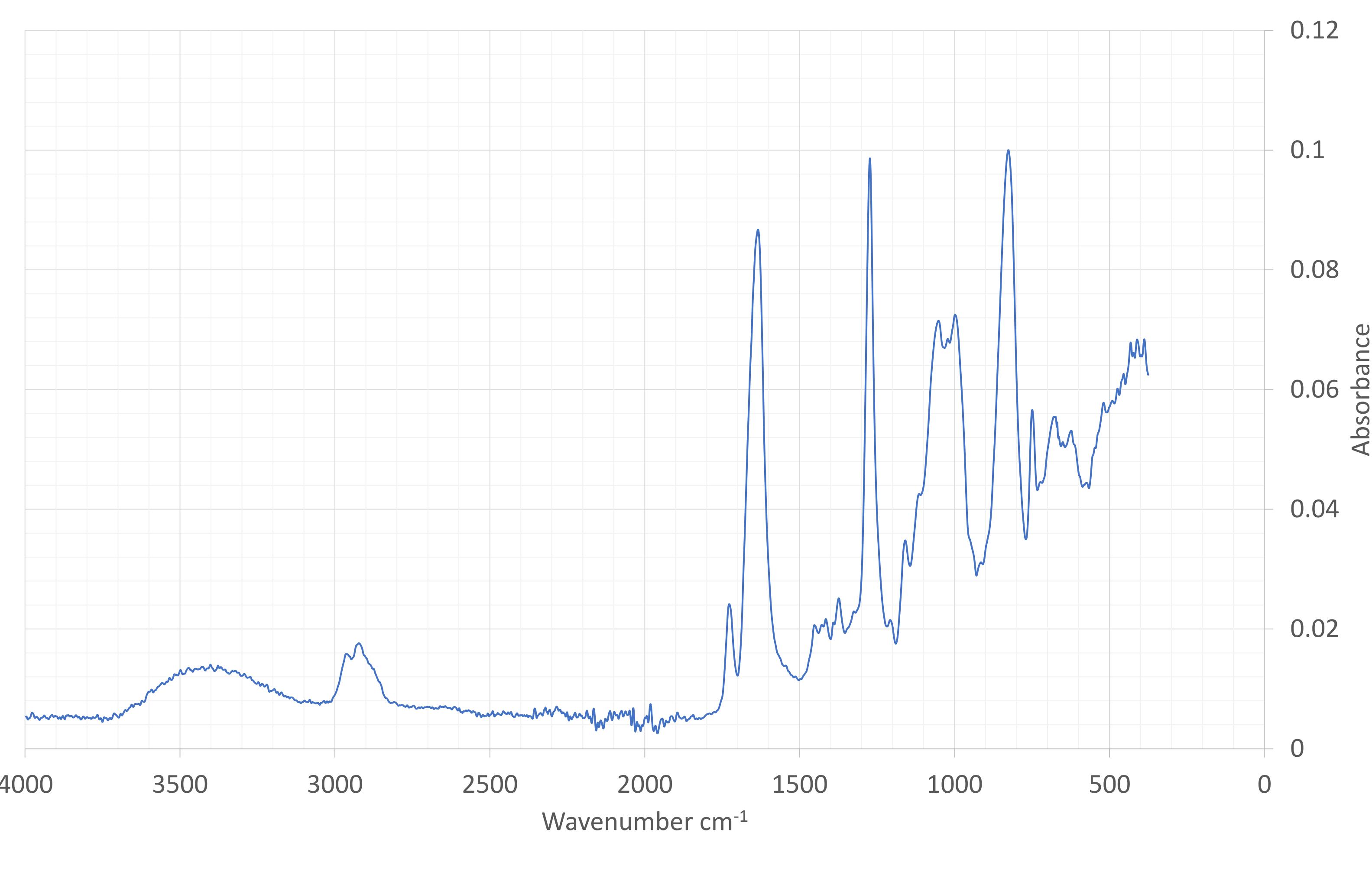
Attenuated Total Reflection Fourier Transform Infrared Spectroscopy (ATR-FTIR) is a technique allowing materials to be identified without sample preparation. Materials are pressed onto a diamond crystal using an adjustable clamp. An infrared beam measures frequencies absorbed by the sample material at the diamond interface due to excitation and vibration of chemical bonds. Infrared spectra are reported on a graph as absorbance versus wavenumbers.



Portable FTIR instrument



Cellulose nitrate hat ornament.
Pointer shows area of FTIR analysis.



ATR-FTIR spectra for Cellulose Nitrate

The spectral "fingerprints" of a material can be matched against spectral libraries containing known materials. A non-invasive technique, ATR-FTIR is especially applicable for identifying of organic materials in cultural collections, where removing sample material from objects for analysis demands careful ethical justification. The development of portable instruments that can be used within storage areas has made this analytical technique increasingly attractive to professionals working with historical collections.

Garments held in the Grainger Museum were owned by Percy Grainger, his mother Rose (1861-1922), and his wife Ella (1889-1979). Displayed are garments belonging to the two generations of women in Percy's life, beautifully illustrating the transition in fashion from natural materials to modern synthetic polymers during the twentieth century.

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