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MATERIALS ANALYSIS

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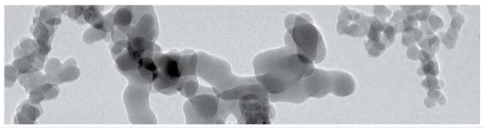
Our team solves your most complex particle identification problems



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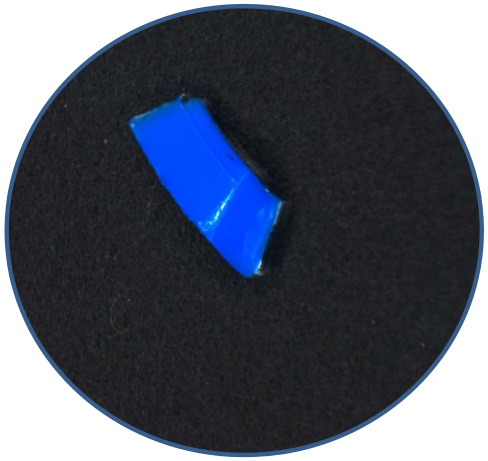
Techniques for Obtaining Infrared Spectra

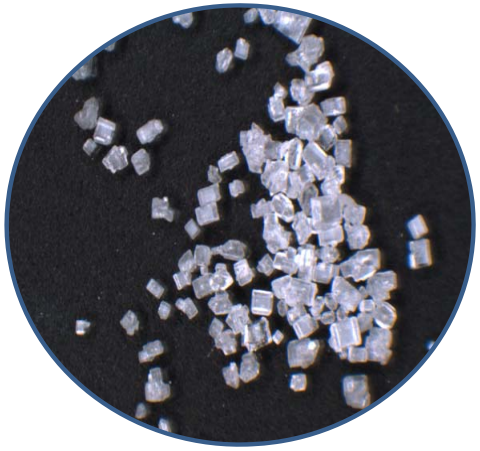
Andrea Champagne
Research Chemist, McCrone Associates
September 3, 2015

Why Infrared Spectroscopy?

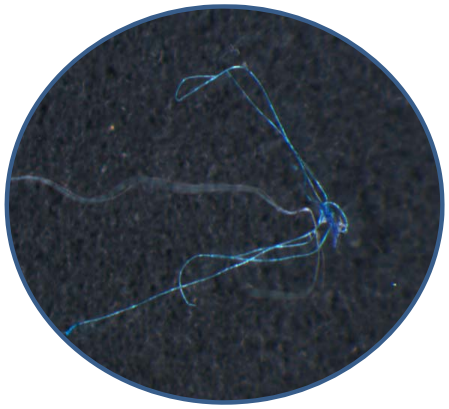
Non-Crystalline powder



Solid - polymer

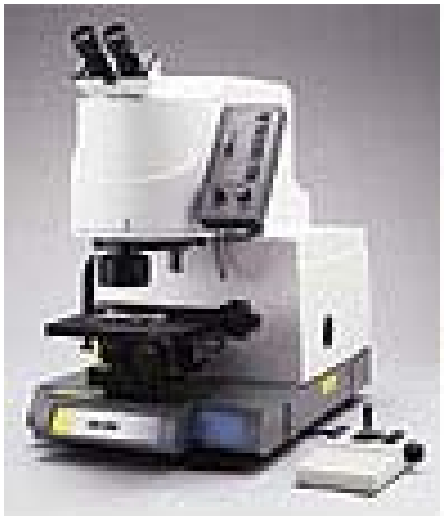


Crystalline powder



Fibers

Infrared Microspectroscopy



Case Study: Dark particle

- Liquid sample with small particulate
- Identify particulate
  - Possible sources?

Sample Assessment

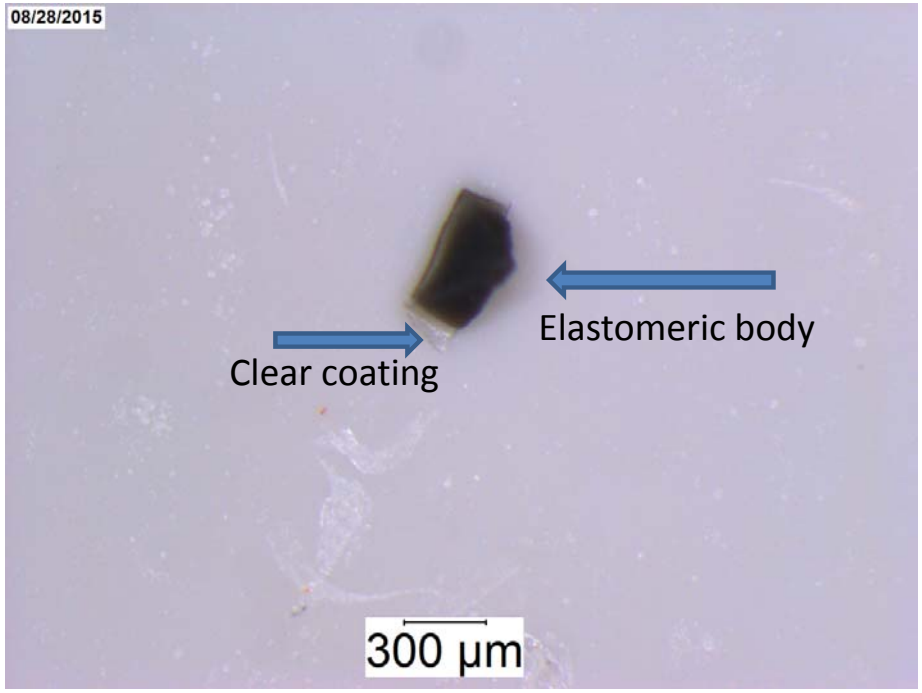
Stereomicroscope

Exam

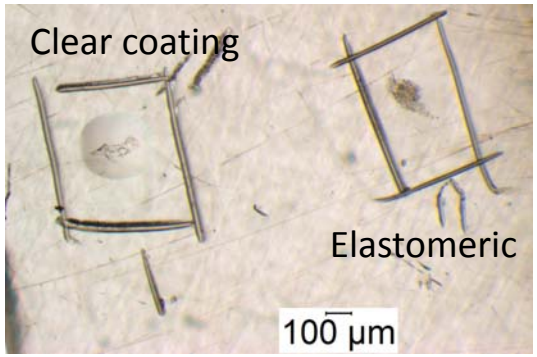
- Physical Appearance
  - Color
  - Size
  - Texture
    - Hard
    - Brittle
    - Elastomeric
    - Soft
    - Plastic like

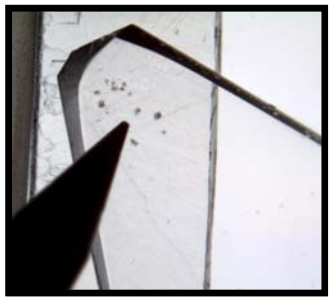
Sample Assessment

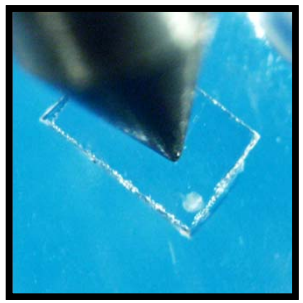
Particle from Liquid



Infrared Prep – KBr plate



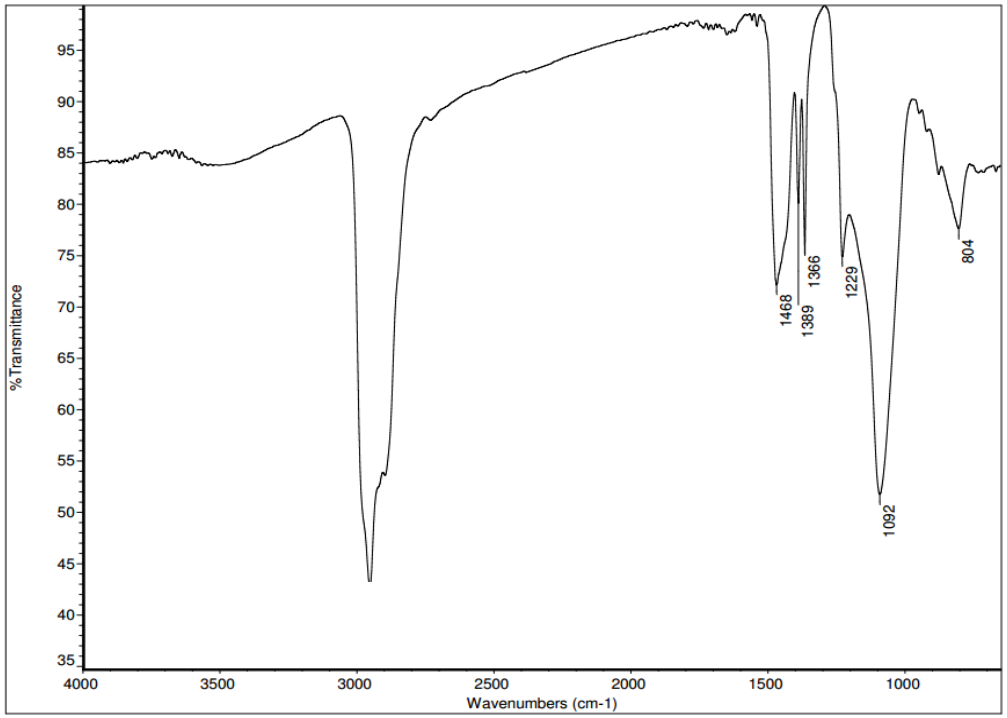




Case Study Results

Clear coating

Gray Elastomeric Body



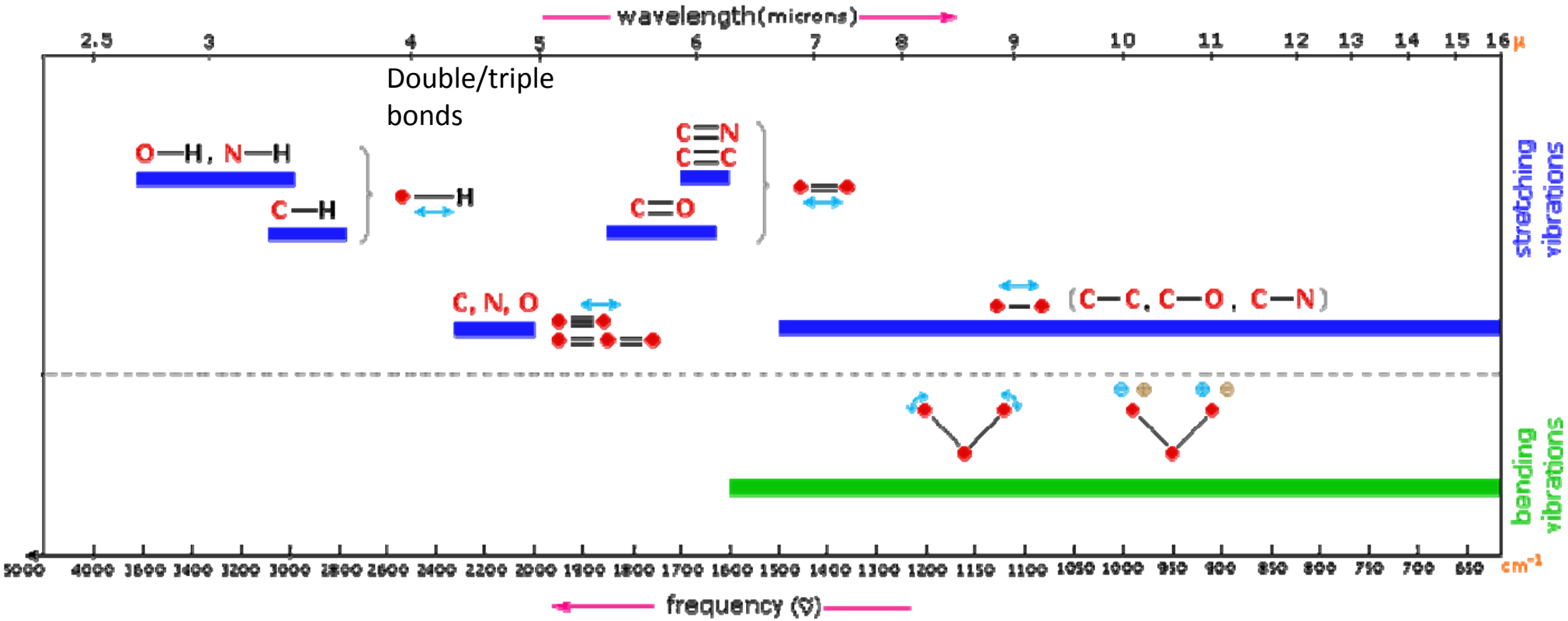
Clear Coating

Sample Spectra

Spectral Qualities

- Low noise
- Flat baseline
- No bottomed out peaks
- Absence of water and carbon dioxide

Correlation Chart

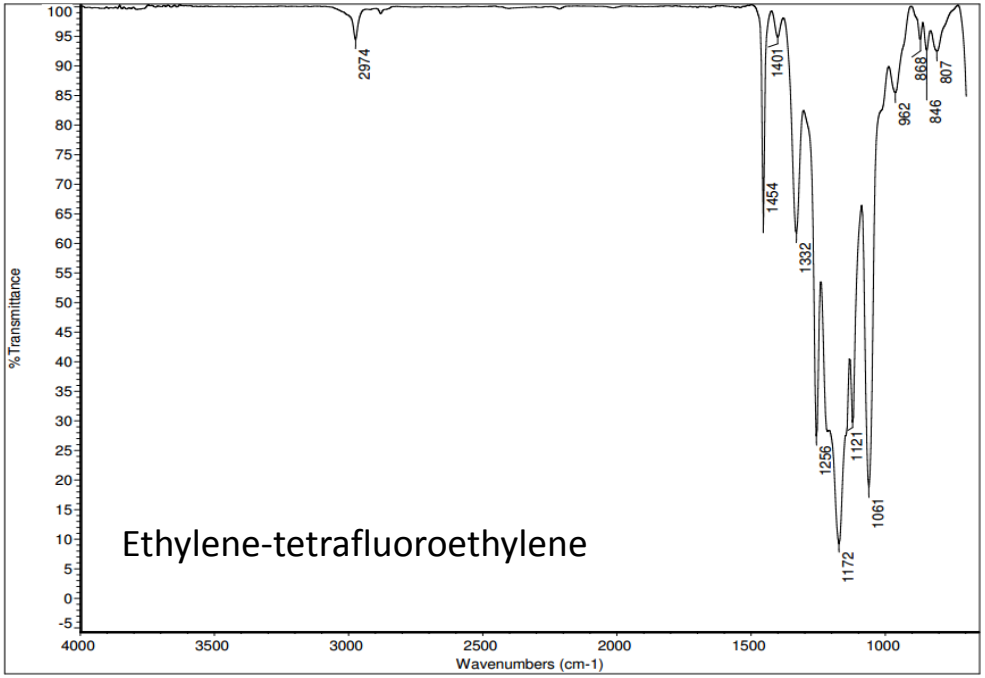


Courtesy of MSU

Spectral Searching

Clear Coating

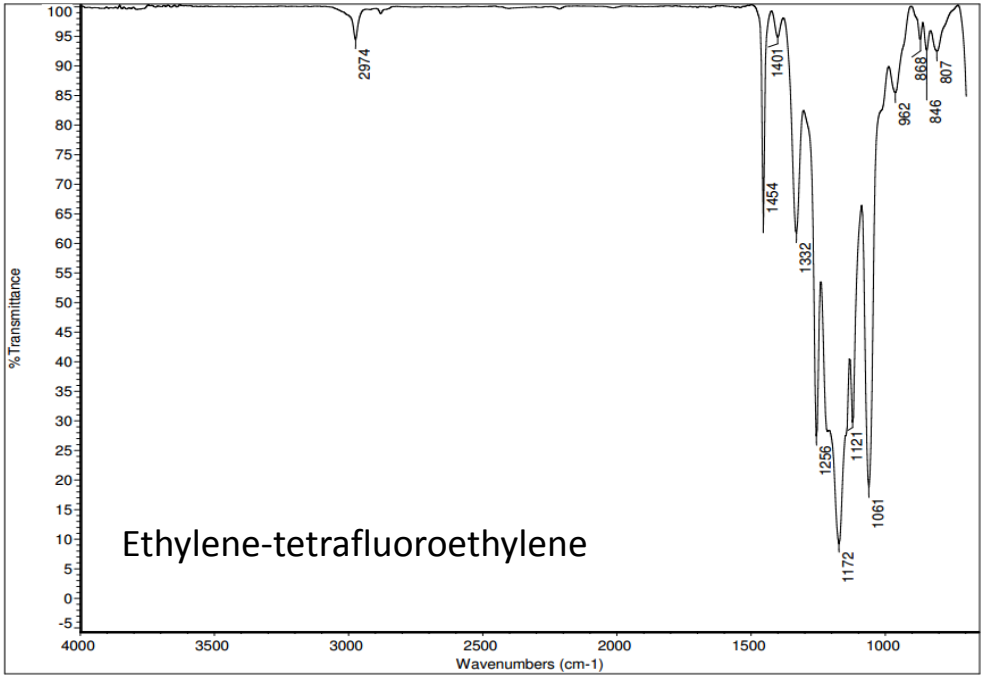
Library Search – Best Match



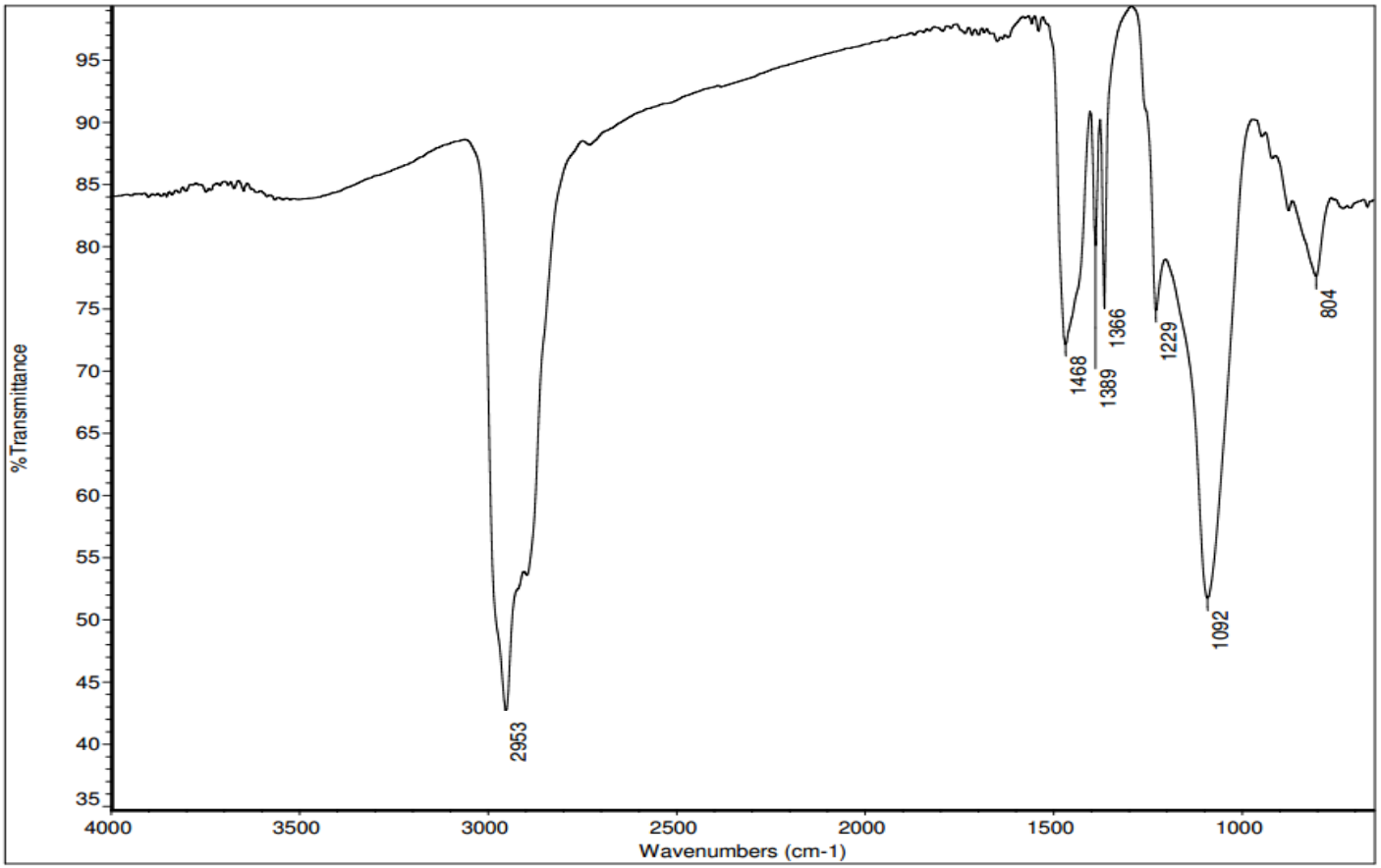
Spectral Searching

Clear Coating

Library Search – Best Match

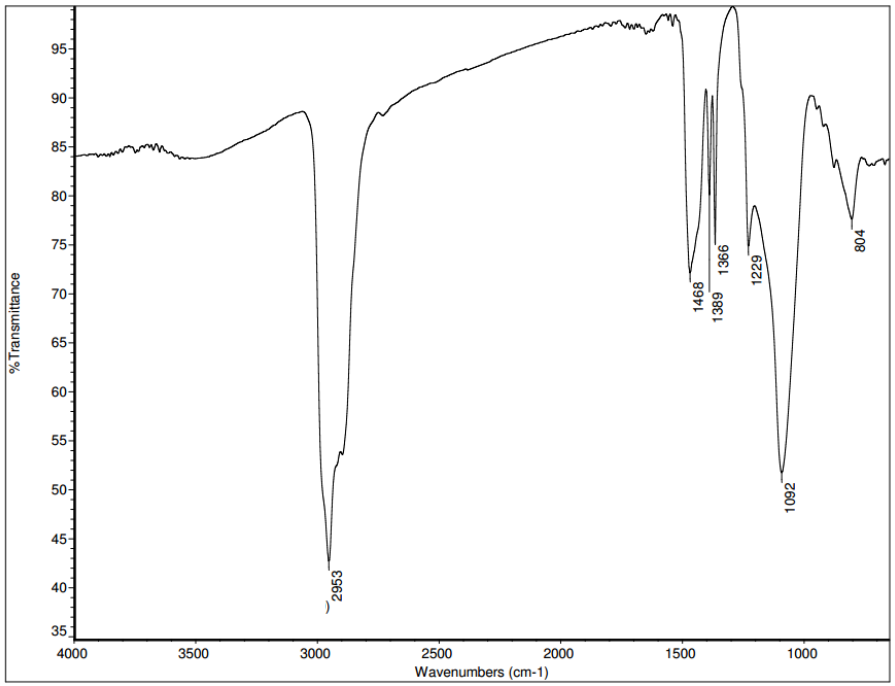


Gray Elastomeric Material

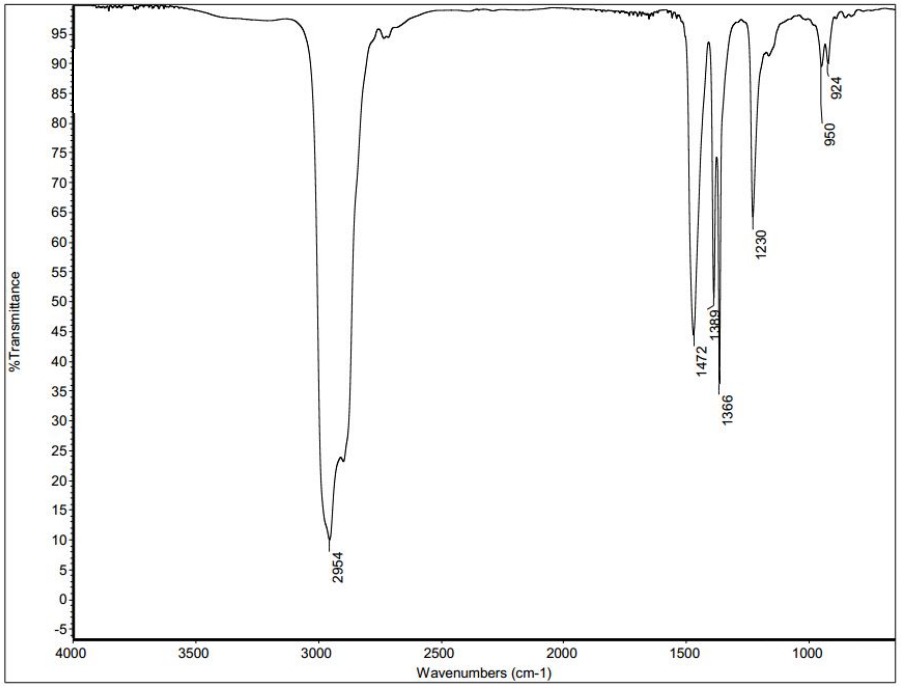


Spectral Search

Gray elastomeric core material

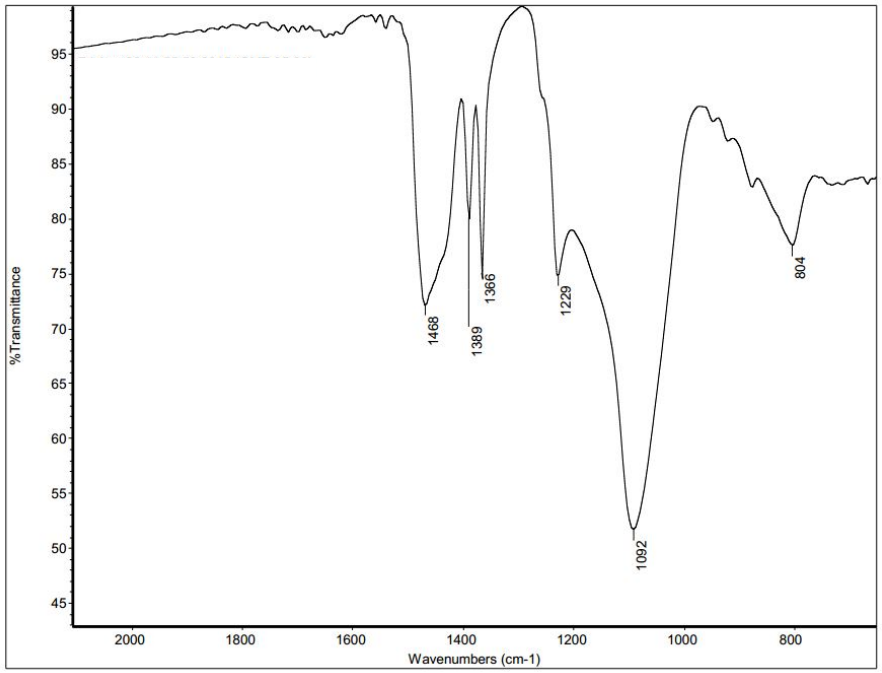


Library Match – Poly(isobutene)



Spectral Interpretation

Gray Elastomeric



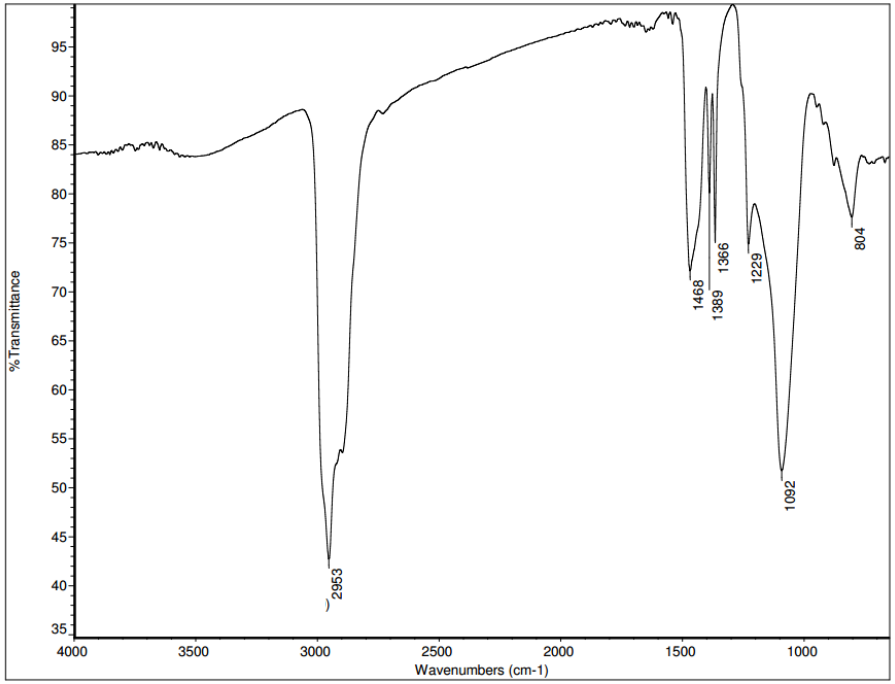
Molecular vibrations at ~ 1090 cm^{-1}

Inorganics

- Silica, silicates
  - ~1100 – 1000
- Phosphates
  - ~ 1100 – 1000

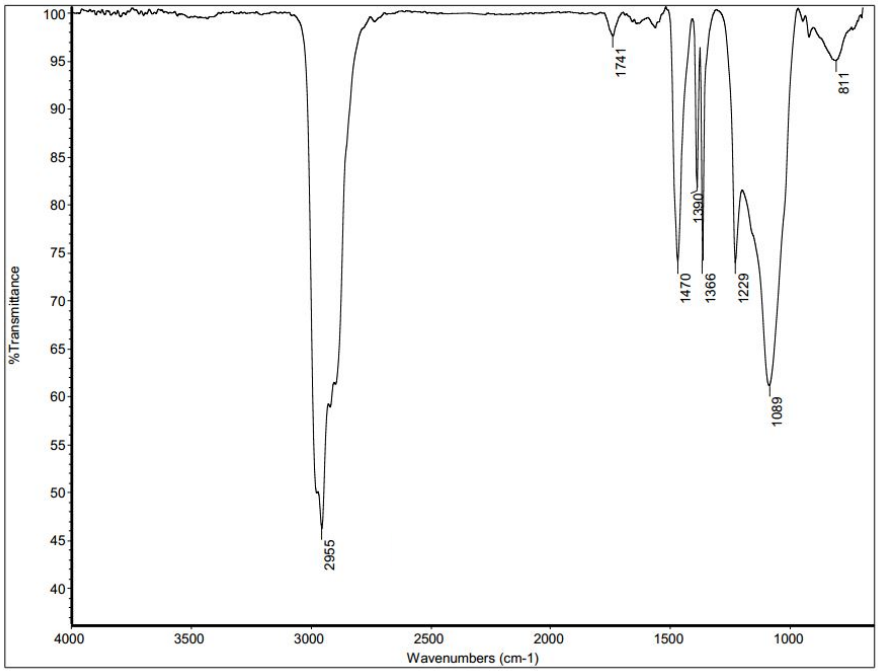
Personal Libraries and Databases

Gray Elastomeric Particle



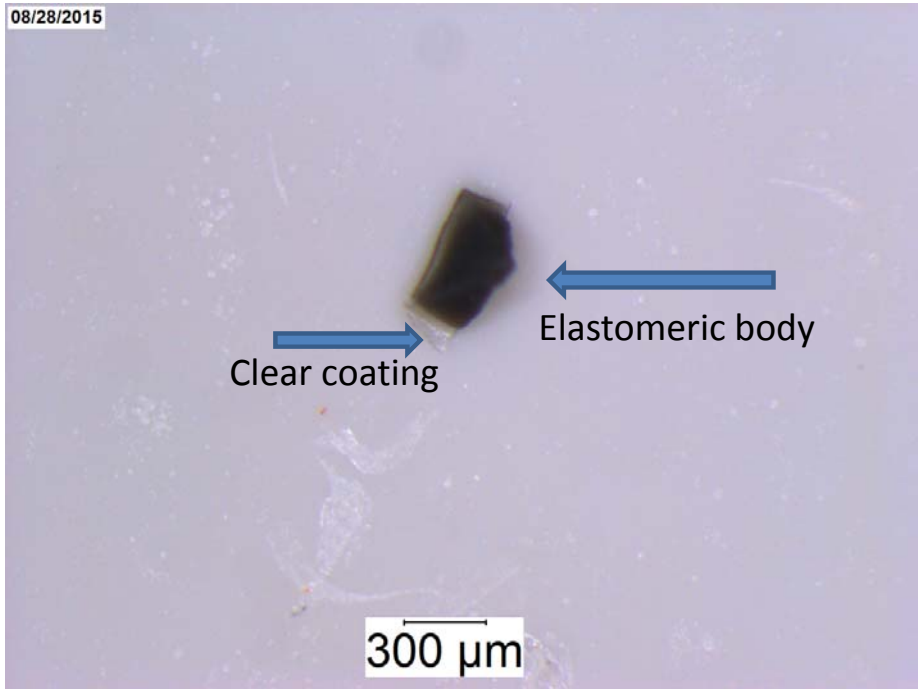
McCrone Library

Isobutene Rubber w/ Silica



Case Study - Conclusions

Particle from Liquid



Conclusions

- Isobutene Rubber with silica filler
- Fluorinated polymer coating

Upcoming Courses

Conducted at Hooke College

- Analysis of Low Explosives
  - September 21-25
- Spectral Interpretation
  - September 22-24
- Microscopic Particle Handling: Sample Preparation
  - October 6-8
- Scanning Electron Microscopy
  - October 19-23
- Pigment Identification
  - November 2-6
- Infrared Microscopy
  - November 3-5
- Lyophilization: Practical Applications Utilizing the Latest Equipment
  - November 3-5
- USP <788>
  - November 12

Upcoming Webinars

Visit www.mccrone.com/webinars

- Developing an Efficient Freeze Dry Cycle
  - October 1, 2015
- Transmission Electron Microscopy: Characterization of Glass Delamination
  - October 29, 2015
- McCrone Associates' Capabilities: The Particle Approach
  - November 19, 2015
- NeoScope vs. Full-Sized SEM
  - December 17, 2015

Thank you for joining us.

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