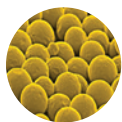


## FAILURE ANALYSIS SERVICES

The McCrone Group offers you an unlimited scope in the analysis of failed products and materials. Our team of scientists has unmatched experience in solving a wide variety of particle identification and materials problems. Our faculty of experts can teach you the techniques, and our knowledgeable sales team can help you configure the instruments to meet the analytical needs in your laboratory. From analysis to education to instruments, The McCrone Group is your premier microscopy resource for the scientific analysis of product failures.



ANALYSIS • **McCRONE**<sup>™</sup>  
ASSOCIATES, INC.

**McCrone Associates** is focused on solving particle identification and materials problems. The root cause of many material failures often has a particulate basis. Examples include contaminants in the manufacturing process, heterogeneous distribution of alloying inclusions, environmental effects and mechanical defects. Our staff scientists use state-of-the-art instruments and techniques to provide you reliable, confidential failure analysis.

### Analytical Services:

#### Optical Analysis

- Particle Morphology
- Relative Refractive Index Determination
- Presence or Lack of Birefringence
- Color Determination
- Mechanical Artifacts

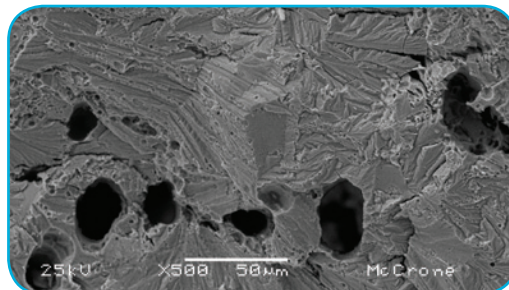
#### Chemical Analysis

- Elemental Composition
- Compositional Distribution
- Crystal Structure
- Classification of Organic Materials
- Chemical Functional Group Determination

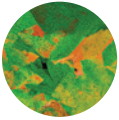
McCrone Associates maintains professional and business relationships with a number of other laboratories where additional analysis beyond the capabilities of our laboratory can be obtained.

### Common Failure-related Problems:

- Metal Corrosion
- Metal Impurities
- Circuit Board Contact Failures
- Glass Impurities
- Hard Polymer Impurities
- Can Coating Defects
- Welding Flaws



*Stainless steel fracture face showing deep pits from stress corrosion cracking along with transgranular cracking and fatigue striations.*

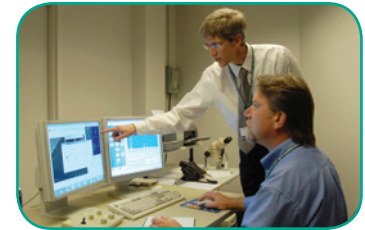


EDUCATION • **HOOKE COLLEGE™**  
OF APPLIED SCIENCES

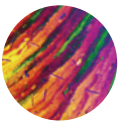
**Hooke College of Applied Sciences** offers a wide range of courses relating to the analysis of failed materials and manufactured products. Our hands-on courses, taught by experts in the field, explore a variety of techniques and instruments and all are IACET (International Association of Continuing Education and Training) approved.

**Our failure analysis-related courses include:**

- INS500: Modern Polarized Light Microscopy
- INS510: Scanning Electron Microscopy
- INS520: Transmission Electron Microscopy
- SMP500: Microscopic Particle Handling: Particle Isolation, Manipulation and Mounting
- SMP510: Sample Preparation: Polymers, Paints and Coatings
- SMP520: Sample Preparation: Particle Isolation for Transmission Electron Microscopy



*Each Hooke College of Applied Sciences course is taught by recognized experts in their fields and in microscopy, with decades of real-world experience.*



INSTRUMENTS • **McCRONE™**  
MICROSCOPES & ACCESSORIES

**McCrone Microscopes & Accessories** offers you proven microscopy equipment and accessories for a variety of failure analysis applications. Our technical sales team has helped create custom instrument packages to fulfill the needs and specifications of laboratories around the country. We can help outfit your entire lab and provide ongoing product training and support.

**Our conservation products include:**

- Olympus SZX Series Zoom Stereo Microscopes
- Olympus BX Series Polarized Light Microscopes
- Linkam Thermal Stages
- NeoScope Benchtop SEM
- Digital Cameras
- Slide Reference Sets
- Reference Books
- Lab Supplies
- Product Training and Support at Your Site



*McCrone Microscopes is the national dealer for Olympus polarized light microscopes.*