

## **SOLVING FORENSICS MYSTERIES WITH THE XRF MICROSCOPE.**

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X-Ray Fluorescence (XRF) spectroscopy is useful for identifying substances and confirming their identity with little or no sample preparation. With the new technology of XRF microscopy and integrated computer databases of known XRF spectra, nearly any substance can be identified. For example, XRF can be used to locate the make, model, and year of car by analyzing a paint chip. This presentation will provide practical insights into the application of the XRF Microscope to the analysis of trace elements, counterfeit products, museum and archeological objects gun shot residue, and fingerprints.

The Horiba XGT-7000 XRF analytical microscope was used in this study. This desktop unit utilizes a portable 50W X-ray source for excitation, two switchable (as small as 10 microns) monocabillaries for different spatial resolution, and the unique capability to work in vacuum, in partial vacuum, and under ambient conditions. In addition to the XRF spectrum/image, the XGT-7000 provides a micro-transmission image of the material.

New capabilities of the energy dispersive XRF (EDXRF) analytical microscope enable the recording of the hyper-spectral image with spatial resolution as small as 10 micrometers. This means that the data can be mined for unsuspected elements after the measurements have been made, and that sophisticated multivariate analysis tools can produce chemical distributions of the elements, in particular with association between elements that can aid in identification of bonded phases. Chemical and transmission images showing the elemental and density distribution of a number of forensics examples along with EDXRF spectra will be shown.