

# MAI Announces our newest capability: X-Ray Diffraction (XRD)

X-ray diffraction (XRD) is an analytical technique used to characterize crystalline phases of a wide variety of materials, typically for mineralogical analysis and unknown identification. We utilize an extremely high power rotating anode X-ray beam that is diffracted onto a two dimensional area detector, and allows analysis of 10-100mg sample sizes.

Powder sample preparation is key in preparing significant amounts of very small crystals in a random orientation. This ensures accurate identification and quantitation of existing major and minor mineral phases.

Mineral identification and interpretation are performed by matching the diffraction pattern of the unknown sample with experimentally collected patterns of from the International Center for Diffraction Data (ICDD) powder data files by skilled mineralogists.

### Principal analysis applications of XRD include:

- Identification & quantification of crystalline phases
- Structural Variations (Polymorphs)
- Compositional Variations (Solid Solution)
- Textural Analysis
- Determination of the ratio of crystalline to amorphous material in bulk material

### Principal technique applications of XRD include:

- Identification and quantification of minerals, rocks, ore, and ceramics
- Mineral speciation
- Identification of unknown components of bulk samples
- Corrosion products and corroded materials
- Quality control of raw materials & concrete
- Forensic science analyses

### Qualitative Analysis:

- All minerals identified by XRD analysis are reported and grouped into major, minor, and trace components.

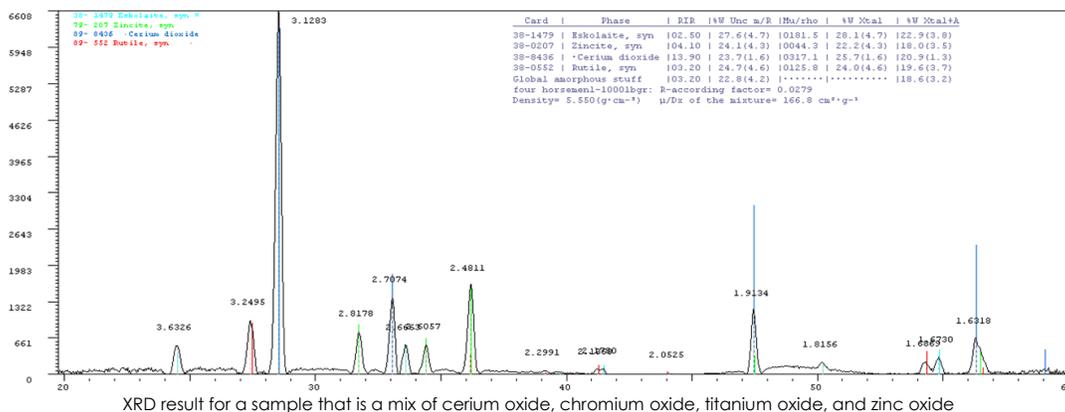
- Identification and classification of abundance are based on relative peak heights and mineral crystal structure.

### Semi-Qualitative Analysis:

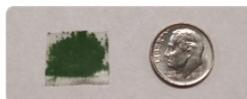
- Mineral abundance (in the form of weight %) are calculated. McC Campbell Analytical uses two different method for quantitative analysis, the reference intensity ratio (RIR) and the Rietveld method.

### Corrosion Analysis:

- XRD is the only analysis method that readily provides information about the phase-composition of solid materials.
- Furthermore, XRD can readily distinguish between different crystallographic modifications of phases that have the same chemical formula.
- Corrosion ID can help to locate the origin of corrosion in a facility and, at the same time, provide solutions to the problem.



XRD result for a sample that is a mix of cerium oxide, chromium oxide, titanium oxide, and zinc oxide



Sample amount needed for XRD analysis – just a dime!

Questions or Concerns? Please contact us