WINNER

1999 R&D 100 Awards Winner

CHEMIN: A Miniaturized X-Ray Diffraction and X-Ray Fluorescence Instrument

Features

CHEMIN quickly and unambiguously identifies the elements and the minerals or synthetic crystals in powders and fine-grained samples. An inch-square charge-coupled device (CCD) records both the x-ray fluorescence spectrum and the pattern of diffracted x-rays from a sample held in the path of an x-ray beam—the fluorescence spectrum characterizes the chemistry of the sample, and the x-ray diffraction pattern reveals the crystalline makeup. The first instrument optimized for collecting both kinds of data, CHEMIN condenses the functions of large x-ray diffraction and x-ray fluorescence laboratory instruments into a miniature package, small enough to hold in your hands. CHEMIN gathers high-resolution data from less than a milligram of sample material.

Applications

Some of the applications of CHEMIN include

- identifying the elements and crystalline constituents of tiny samples—particularly useful when material is costly, rare, or difficult to fabricate;
- determining the nature of contaminated material—CHEMIN can fit inside a glove box or shielded container;
- sampling the feedstock in industrial processes for which mineral content is crucial to the integrity of the product, such as steel and cement production;
- analyzing geologic samples for mineral content, especially when minute amounts must be recognized—e.g., when testing for precious minerals or dilute hazardous material; a and
- assaying powdered rock for mineral content at mining sites.

Benefits

- Thorough, rapid analysis of any powder or fine-grained sample
- Less than a milligram of material needed for analysis
- Samples require little preparation
- Small, lightweight instrument—easily set up anywhere electricity is available