



Handheld X-Ray Diffraction Analysis

- **Non-destructive materials analysis**
- **No sample preparation**
- **Point-and-shoot**

Challenge

- Current X-ray diffraction (XRD) methods usually require careful sample preparation, such as grinding to a fine powder. The sample, or part of it, is destroyed in the process.
- Conventional XRD instrumentation is bulky with limited portability, so samples have to be sent to off-site laboratories with a turnaround time of days or weeks.

Solution

- Handheld XRD instrumentation that can provide a rapid (1-2 mins) in situ phase analysis of a sample with no preparation requirement.
- Avoiding sample preparation is a key time-saving step in itself, and the sample is analysed in its native condition with no biases or changes introduced by preparation methods.
- Multiple potential applications including mining (e.g. iron ores, limestone quality), metals and alloys, especially steel analysis, and cultural heritage.
- Instrumentation can be tailored to provide enhanced detection of a specific mineral or crystalline phase.
- For mining and industrial applications, streamlining of operations provide major cost savings. An example is grade control of iron ores prior to shipping.



Benefits

- The same instrument can also provide elemental analysis by X-ray fluorescence (XRF), complementary to the XRD phase analysis.
- Much lower cost of instrumentation.
- Easy-to-use handheld operation with an instrument weighing ~2 kg.
- In mining applications, provides rapid delineation of ore boundaries and rapid assays at the mine face.
- Assessment of ore grades allows efficient management of blasting, excavation and haulage.
- For manufacturing applications e.g. steel production, provides rapid feedback of production processes and minimises losses.

Market

- For mining applications, this product serves to improve the overall mine efficiency in several ways, yielding considerable costs savings and minimising waste.
- In metallurgy, allows rapid fine tuning of difficult-to-control manufacturing processes.

- Rapid retained austenite sorter e.g. quality control of parts using a threshold criterion.
- Optimisation of heat treatments in the manufacture of, for example, advanced high strength steels.

IP status

- Two technologies supported by two independent yet related patent applications. Depending on the intended applications, either or both patents could be utilised.
- Methods and apparatus of X-ray diffraction: AU2013250980, US2013279653, EP2839269.
- X-Ray analysis device: PCT/GB2016/051559

Find out more

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