Multi-Element-Analysis MEDINA

Technology Offer

Multi-Element-Analysis MEDINA (see attachment 1)

Department & Inventor

Institute for Energy and Climate Research, Safety Research and Reactor Technology (IEK-6)
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Patents

International patent application WO 2012/010162 is filed with priority 22.07.2010 and nationalization in Europe, USA, Australia, China and Japan.

Existing Licenses

Currently we are conducting talks with leading manufacturers of telecommunication equipment and recycling companies.

Market

The market research institute ABIresearch predicts in its study "E-Waste and Recycling" a tripling of sales in the e-waste recycling industry from 5.7 (2009) to almost 15 billion USD by the end of 2014, representing a growth of more than 20 % of global sales. E-Waste is the fastest growing market in the area of waste. Metals recovered from e-waste range from gold, silver, copper and aluminum to rare metals like platinum, gallium, indium and palladium.

Developmental Status

Offered is a measuring method. It is originally developed for the investigation of barrels with low to medium-level radioactive waste for heavy metals like mercury and lead. A Prototype for large-volume samples (200l drum) is available.
Still further R&D is needed for the recycling sector. The Forschungszentrum Jülich is open to collaborations for further research and development. Licensing terms constitute the usual standards and are negotiated individually.

Additional Information upon Request

- Presentation on MEDINA for industry partners

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Multi-Element-Analysis MEDINA

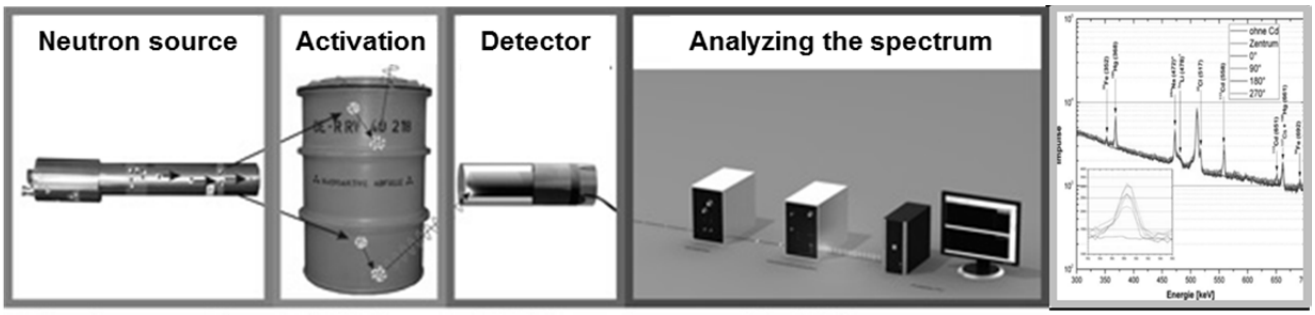
Technology

At Forschungszentrum Jülich (member of the Helmholtz Association of German Research Centres), a non-destructive measurement technology was developed. This technique - “Multi-Element Detection based on Instrumental Neutron Activation” (MEDINA) - allows the qualitative and quantitative determination of elements in large volume samples. The method is based on the detection of prompt and delayed gamma radiation after neutron activation, and can be applied for almost all elements in the periodic table, e.g. heavy metals or rare earth elements.

Irradiation by a neutron source results in short-term activation of elements in the sample. During neutron capture or after an individual half-life, the activated atomic nuclei start to emit radiation that is characteristic for and specific to every element.

Using gamma ray spectrometry, a gamma spectrum of the sample is taken and analyzed using special software. The position of the signals and size of the peaks are used to estimate the type and amount of existing activation products, thus enabling the determination of elements contained within the sample.

Analyzing the ratios of different elements permits limited identification of certain compounds or groups of elements.



Customer benefit

The key advantage over spectroscopic methods, such as XRF or ICP-OES, is the ability to examine a large volume of material, e.g. piece goods and bulk goods, as a whole without destruction. Unlike the spectroscopic methods, neither representative sampling nor elaborate chemical extraction procedures are necessary. The high sensitivity of the method enables concentrations in the ppm range to be detected.

Next steps

Originally developed for nuclear waste the method can be applied for a wide range of materials, such as electrical and electronic equipment or E-waste. Forschungszentrum Jülich is interested on commercialisation by licensing or R&D cooperations.

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