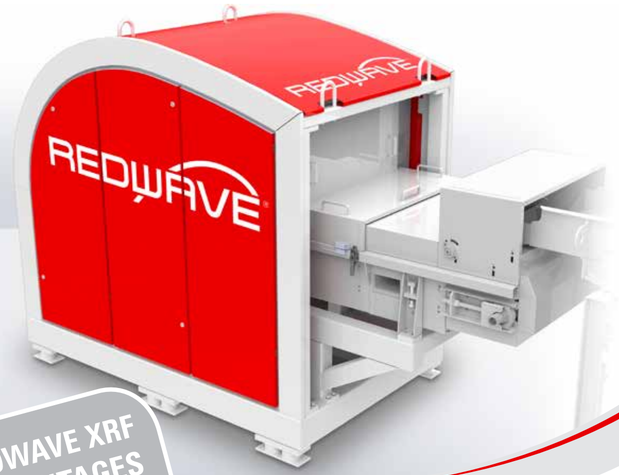

REDWAVE XRF ADVANTAGES

Cost effectiveness

It is possible to identify and separate different materials such as heat resistant and leaded glass in a single process step and with only one sorting machine.

High performance

Recognition and separation occurs at maximum speed.
For example: A sorting width of 1,3 m enables to sort up to 28 t of cullet per hour.

High recovery rates

Impurities are separated with highest precision.
For example: Impurities in the waste glass for instance, having a cullet size between 8 and 60 mm, can be separated with an accuracy of up to 98%.

Efficiency

There is minimal material waste.
For example: The proportion of glass rejected during the separation of impurities is below 1%.

Regardless of humidity and contamination

High sorting quality will not be impaired by wet / dirty glass or other contaminations such as plastic or paper labels bonded to the glass.

Flexibility

The technology allows quick on-site modification to recalibrate the systems. Therefore, easily adaptable to changing conditions to meet market demands.

Application

In general all solid materials, which contain a specific and characteristic element, can be analyzed and separated. This element is used as sorting criteria. The technology of X-ray fluorescence is therefore not limited to one material class or application but can be used in a wide variety of fields. Here are some application examples:

Glass:

- Lead glass
- Glass ceramics
- Ceramics
- Screen glass
- Etc.

Minerals:

- Arsenic minerals
- Mercurial minerals
- Separation of ore with different contents of accepted materials
- Sorting of different minerals according to grade purity
- Etc.

Metals:

- Brass
- Copper
- Stainless steel
- Iron
- Chrome
- Zinc
- Vanadium
- Different varnished metals
- Etc.

Plastics:

- Separation of bromined plastics of shredded plastics
- Etc.

Electronic scrap:

- Separation of electronic scrap coated with non-ferrous metals from shredded electronic scrap
- Separation of boards, etc.

Quality control:

Can be used as online quality control in the above mentioned areas as well as where a characteristic element is existent.

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designed by BTMC | RED-S19-52

REDWAVE XRF

Material recognition, separation and quality control with X-ray fluorescence spectrometer

www.redwave.com

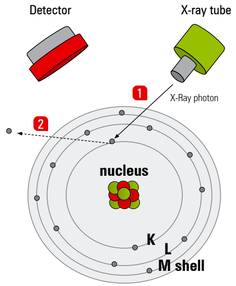
REDWAVE XRF

1 Acceleration conveyor

2 XRF Sensor

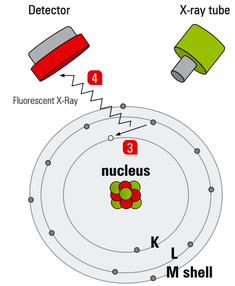
3 Ejector unit

4 Divider plate



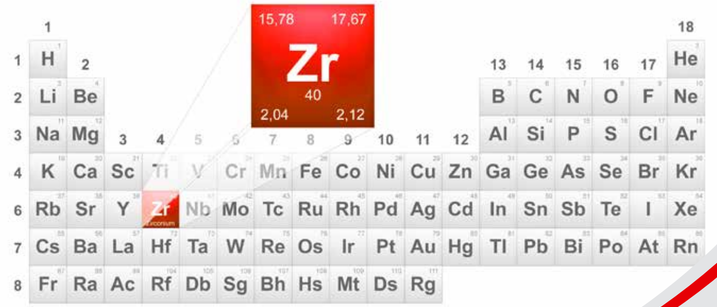
1 The X-ray tube emits photons towards the target material.

2 The electron is ejected out of the atomic shell, which creates a free spot.



3 An electron from an outer shell fills the free spot.

4 Excess energy is emitted in the form of secondary X-ray radiation.



REDWAVE

The REDWAVE XRF system is capable of sorting and separating different types of material - glass, ceramics, metals, minerals, plastics, etc. - by measuring difference in their elemental composition. The sorting criteria can be based on one element, multiple elements or even a ratio of two elements. For example, the elements lead (Pb), zirconium (Zr) and zinc (Zn) are used to remove leaded and heat resistant glass from waste glass, while sorting brass and other non-ferrous metals by alloy can be done by using a ratio of two distinguishing elements.

Apart from its capability for sorting materials, REDWAVE XRF can also be used as quality control with different materials.

The sorting system combines the REDWAVE technology – a fully proven system in optical sorting technology, introduced to the market many years ago – and the X-ray fluorescence technology of Olympus Innov-X.

REDWAVE XRF - Operating mode:

Scrap material is constantly fed over the entire sorting width of a conveyor belt by a vibratory feeder. The XRF sensor then performs an ultrafast elemental analysis of every single piece, regardless of its physical properties such as thickness and colour or the presence of labels or other impurities.

If the chemistry of the material meets the set ejection criteria, a signal is sent to the ejection units. High speed valves and air jets, operated by compressed air, then eject that piece of material.

Basics of X-ray Fluorescence

X-ray fluorescence (XRF) spectroscopy is a widely used and proven technology for measuring the elemental composition of material. By using XRF technology a wide range of elements can "simultaneously" be detected and analyzed.

The Bohr Model describes the atom as a small positively charged nucleus surrounded by negatively charged electrons in stable, concentric orbits, similar to our solar system.

In XRF Spectrometry, high-energy primary X-ray photons are emitted from a source (X-ray tube) and strike the sample. The primary photons from the X-ray tube have enough energy to knock electrons out of the innermost, K or L, orbitals or shells. When this occurs, the atoms become ions, which are unstable. An electron from an outer orbital, L or M, will move into the newly vacant space at the inner orbital to regain stability. As the electron from the outer orbital moves into the inner orbital space, it emits an energy known as a secondary X-ray photon. This phenomenon is called fluorescence. The secondary X-ray produced is characteristic of a specific element. By measuring the secondary X-rays with special detectors, it is possible to determine the elemental composition of the targeted object material.

X-ray fluorescence / X-ray transmission:

With X-ray fluorescence used by REDWAVE XRF the exact elemental composition of the material is determined. The X-ray transmission only measures differences in density.

Safety

The energy level of radiation from the X-ray fluorescence analysis is extremely low. The system is designed and built on the basis of "full protection" and does not cause any increase of radiation levels during operation.

Fields of application for REDWAVE XRF

Material recognition and separation:

In general all solid materials, which contain a specific and characteristic element, can be analyzed and separated. This element is used as sorting criteria.

Example: Recognition and separation of glass ceramics for the sorting of waste glass: Besides some other elements, Zirconium with a mass portion of approx. 2,5% is added during the production process of glass ceramics. Secondary energy radiation of Zirconium has an energy value of 15,78 keV (Kα1) for an electron transfer between L and K atomic shell. In case photons with this energy value are detected and the intensity of the signal is above an adjustable threshold value, the objects can be rejected.

Other fields of application:

- Separation of leaded and heat resistant glass
- Sorting of precious metals
- Sorting of ore and minerals
- Sorting of plastics
- Sorting of electronic scrap

Quality control:

REDWAVE XRF is also applicable for quality control. Elements which must be detected are identified and configured into the system. These elements are continuously identified and evaluated then recorded, giving assurance of a quality material.

REDWAVE