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Multi-spectral X-Ray technology to differentiate inorganic waste products

Incineration slags from household waste contains a relatively large amount of valuable metals. If the various size fractions of slag are inspected and subsequently sorted, valuable metals can be recovered. X-ray technology using multispectral measurement or – imaging has the capability of providing the information on which natural elements are present in the slag pieces, with a high probability.

To demonstrate the capability, the example below shows an X-ray image of samples of oil, water, oil-water, steel, copper, lead, plastic and aluminum. Based on the acquired image, the X-ray spectrum of each material is compiled. From this, it can be seen that the methodology can separate materials based on their spectrum peaks. These measurements can be accomplished in real-time and is thus adequate as a tool for sorting of mixtures of materials.

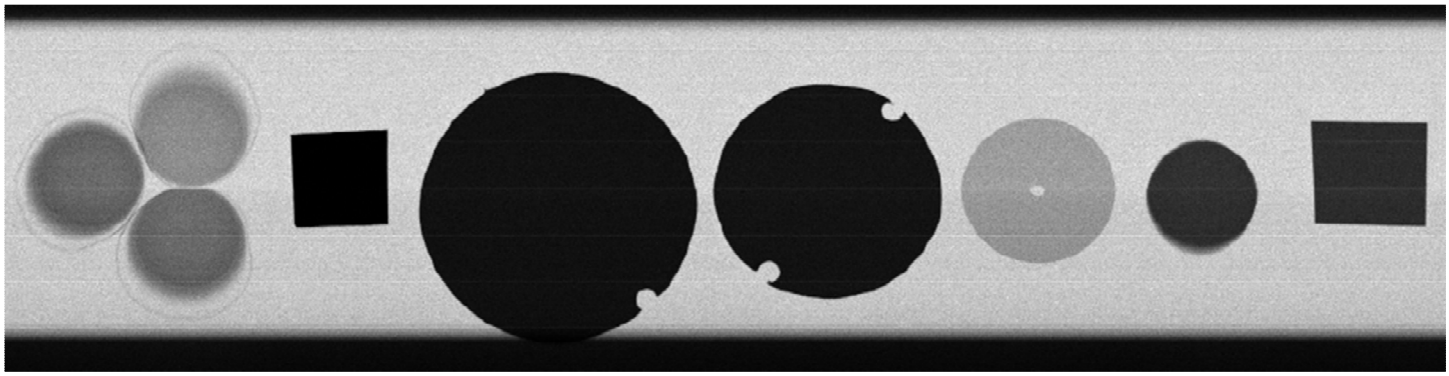

Fig 1. The X-ray image of the samples used in the tests. From left to right: Oil, water, oil-water, lead, steel, steel, aluminum, Teflon, copper

From the X-ray image above, the regions are separated from the background and the X-ray spectra for the different regions is validated. Fig. 2 displays the associated spectral curves for each region covered by the different materials. As can be seen, computational methods can be applied to achieve a quantitative estimation of the proportion of various natural elements.

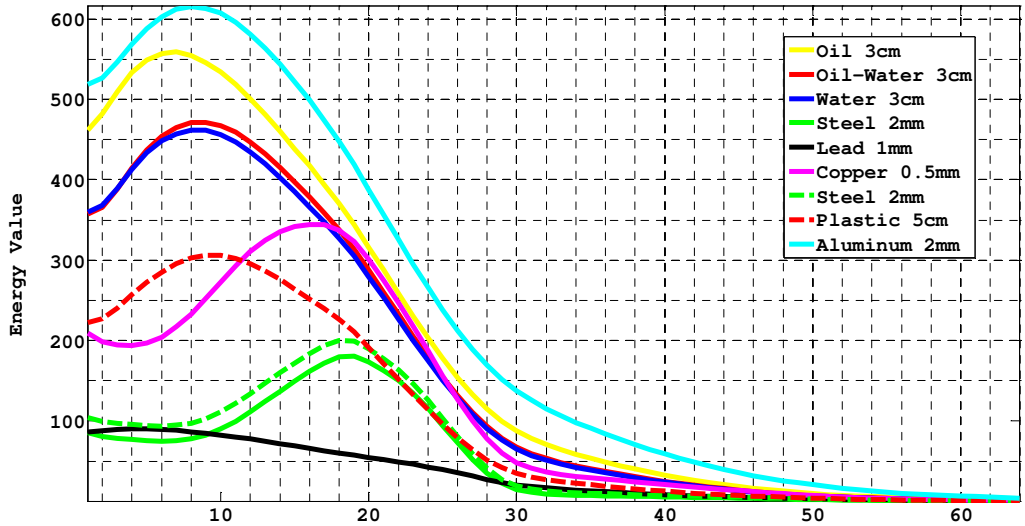

Fig 2. X-ray absorption spectra (represented by energy bins or channels) for the various materials imaged in Fig. 1.