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LIGHT. PRECISION. ANALYTICS.

LIBSorter AI

Laser Induced Breakdown Spectroscopy (LIBS) for industrial sorting of aluminum alloys

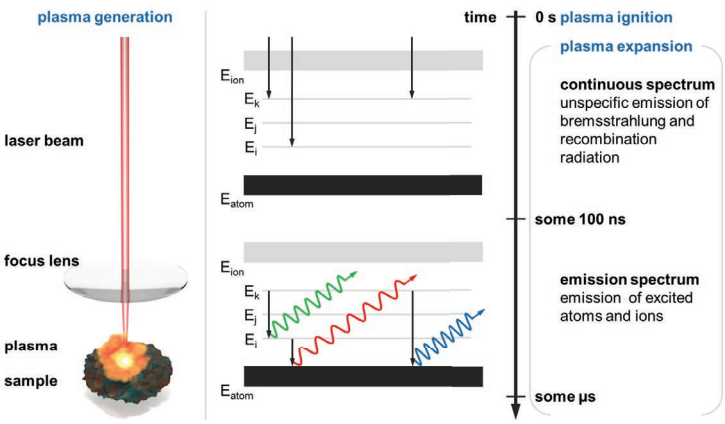
- CLASSIFICATION OF ALUMINUM ALLOYS
- MATERIAL FLOW ANALYSIS WITH 40 SAMPLES/s
- FULLY AUTOMATED 24/7 OPERATIONAL MODE
- APPLICABLE AT CONVEYOR BELTS
- FOR HARSH ENVIRONMENTAL CONDITIONS
- CUSTOMIZED SETUPS

Unsorted scrap aluminum before sorting with LIBSorter AI

The industrial recycling of metallic recyclable fractions is a key component of a complete and sustainable recycling economy. In times of dwindling resources and growing demands for price increasing primary raw materials worldwide, high-quality secondary raw materials recycled from various scraps have become increasingly important for economic and ecological reasons. Accordingly, sensor based analyzers like the LIBSorter AI play a major role in industrial recycling for a fast and precise classification and sorting of mixed scrap aluminum alloys.

Classification of aluminum alloys

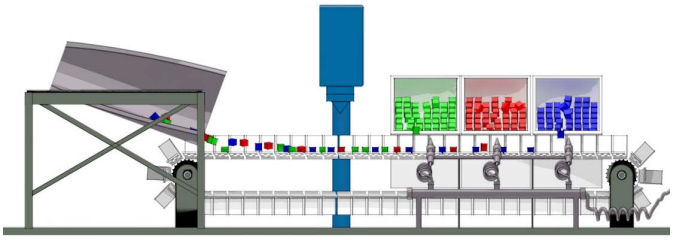
Short pulse laser radiation of the LIBSorter AI is focused on the surface of scattered scrap aluminum parts transported on a conveyor belt and generates a light emitting plasma at high temperatures. The chemical elements contained in the material provide a characteristic emission line spectrum like a fingerprint, which is simultaneously recorded with a single measurement by the applied high-resolution ARYELLE echelle spectrometer. Multi-elemental analysis is based on the implemented spectral data base and mathematical software algorithms that feature a precise classification of several metal fractions. Due to proportional dependences of emission line intensities and related elements, compositions can be evaluated directly from the spectrum and the measured aluminum scrap part can be assigned to the correlated group of alloy and even its sub-group. Fractions like the 5xxx or 6xxx of aluminum alloys so far not sortable by the dry mechanical analysis method can be classified by means of this laser-based method reliably and with high precision.



Principal of laser-induced breakdown spectroscopy (LIBS)

Applicable at conveyor belts

The LIBSorter Al is a robust and low-maintenance analyzer that was developed especially for online analysis of materials being transported on industrial conveyor belts. The fixed optical setup with ± 15 mm depth of field provides accurate analysis of different sample sizes. An optional auto-focus expands the depth of focus to ± 25 mm. For operation under harsh environmental conditions in industrial buildings, the IP 53 control cabinet of the LIBSorter Al is dust-tight and air-conditioned.



Conveyor belt for sorting with air blow-off sorting station

Classification of metals and alloys with LIBSorter Al based on laser-induced breakdown spectroscopy

Fully automated 24/7 operational mode

Equipped with efficient technical solutions for industrial applications, the LIBSorter Al provides a reliable fully automated 24/7 operational mode. The system control based on an industrial PC makes it easy to perform script-based parametrization and maintenance. Available communication interfaces PROFINET, PROFIBUS and Ethernet are the major interfaces for a proper communication with existing industrial system controls, like PLC or PC. Measuring results of material flows with up to 40 samples/s are transferred to the following air blow-off sorting station within minimal delay of time. Throughputs of several tons of aluminum scrap parts (depending on the size) are thus easily possible.

Specifications

Measuring method	laser-induced breakdown spectroscopy (LIBS)	qualitative and quantitative multi-elemental analysis
		non-contact measurement
		no or little sample preparation
		almost non-destructive
Classification of materials	elements	Al, Cr, Cu, Ni, Zn, Si, Mg, Fe, Mn
	wrought aluminum alloys	1xxx to 8xxx (and sub-groups)
		particularly also 5xxx and 6xxx
	other metals and alloys possible	
	recycling of slags, combustion ashes, granules	
Rate	≤ 40 samples/s	
Depth of field *	± 15 mm with fixed optical setup (optional auto focus with ± 25 mm)	
Synchronization conveyor belt	yes	
Control	industrial PC with Windows 10	
	remote control	
	script based	
Communication	PLC, PROFINET, PROFIBUS, Ethernet	
Spectrometer *	type	ARYELLE series
	wavelength range	240 nm – 550 nm
Laser *	DPSS Nd:YAG Laser, λ = 1,064 nm	
	200 Hz	
International Protection Marking	IP 53	
Operating conditions	temperature	+ 5 °C … + 45 °C (optional -10 °C…50 °C)
	relative humidity	70 % non-condensing

* other specifications possible
Subject to technical changes.

LTB Lasertechnik Berlin GmbH • Am Studio 2c • D-12489 Berlin • Germany
+49.30.91 20 75 - 100 • +49.30.91 20 75 - 199 • info@ltb-berlin.de • www.ltb-berlin.de

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