



ARTICLE

LIBS IN ALUMINUM RECYCLING TOWARDS A CIRCULAR ECONOMY



INTRO

LIBS INNOVATION IN ALUMINUM RECYCLING: TOWARDS A SUSTAINABLE CIRCULAR ECONOMY

As the global demand for aluminum grows, industries must increase production while navigating a path toward greater sustainability. In achieving a circular economy, industries need to overcome several hurdles, such as the accurate sorting of aluminum alloys and the assurance of quality recycled materials.

The application of laser-induced breakdown spectroscopy (LIBS) has emerged as a game-changer, offering solutions to these pressing issues. At the forefront of this technology is Avantes, a leading provider of advanced spectrometers tailored for aluminum recycling processes. With decades of experience and a commitment to innovation, Avantes offers a suite of spectrometer solutions designed to optimize recycling operations and contribute to a sustainable circular economy.

CONTINUE READING ON THE NEXT PAGE >

ADDRESSING KEY CHALLENGES IN ALUMINUM RECYCLING THROUGH LIBS TECHNOLOGY

The challenges in aluminum recycling are multifaceted, spanning from efficiently sorting alloys to maintaining the quality and purity of recycled materials. Material recovery facilities (MRFs) face the daunting task of processing vast quantities of aluminum scrap while ensuring accurate identification and separation of different metal grades. However, traditional methods often fail to meet these demands, leading to inefficiencies and compromised quality.

Avantes' advanced [spectrometers](#), equipped with LIBS technology, offer a comprehensive solution to these challenges. LIBS technology facilitates swift chemical analysis of metals through a multi-step process. A laser pulse is directed at the material's surface, heating it by thousands of degrees and generating localized plasma. Upon cooling, this plasma emits visible and invisible light, which is detected and analyzed in a spectrometer to deduce the elemental composition of the metal.^{1,2,3}

The efficiency of LIBS technology enables in-line sorting capabilities, with Avantes' compact spectrometers empowering recycling facilities to achieve unparalleled precision in identifying and segregating aluminum alloys. This not only streamlines operations but also enhances the overall efficiency of MRFs, paving the way for optimized recycling processes.

CAPABILITIES AND ADVANTAGES OF AVANTES SPECTROMETERS

Avantes spectrometers stand out due to their unique features tailored to the specific requirements of aluminum recycling. These include:

- **In-Line Sorting Capability:** avantes spectrometers facilitate real-time, in-line sorting of aluminum alloys, ensuring accurate classification and separation of different aluminum grades for downstream processing.
- **Efficiency Enhancement in MRFs:** by automating the identification and sorting of aluminum scrap, Avantes spectrometers contribute to significant efficiency gains in MRFs, minimizing manual labor and maximizing throughput.
- **Quality Assurance for Recycled Aluminum:** with Avantes spectrometers, recycling facilities can confidently ensure the quality and purity of recycled aluminum, meeting stringent industry standards and minimizing waste in producing new aluminum products.
- **High Speed and Sensitivity:** our spectrometers operate at high speeds, delivering rapid and sensitive measurements essential for maintaining optimal throughput in recycling plants.
- **High Resolution for Spectral Analysis:** Avantes spectrometers offer exceptional resolution, allowing for precise identification and characterization of different aluminum alloys based on their spectral signatures.
- **Seamless Integration and Communication:** designed to integrate seamlessly into the 24/7 operational workflow of recycling plants, Avantes spectrometers feature robust communication protocols and flexible data acquisition interfaces.
- **Custom Solutions and Quick Response:** leveraging over 30 years of experience, Avantes excels in providing solutions tailored to each customer's unique needs.⁴ Our responsive manufacturing and R&D capabilities ensure timely adaptation to evolving requirements in aluminum recycling.

DRIVING SUSTAINABILITY IN ALUMINUM RECYCLING

Creating an efficient and effective aluminum recycling system is indispensable for a sustainable circular economy. Not only does recycled aluminum possess a smaller carbon footprint than primary aluminum production, requiring around 5 % of the energy to manufacture, but it serves as a way for businesses to save money.⁵

Through the adoption of LIBS technology, Avantes spectrometers enable precise alloy sorting, enhance operational efficiency, and ensure the quality of recycled materials. These features allow Avantes to make strides toward advancing sustainability in the aluminum recycling industry, contributing to the establishment of a more sustainable circular economy.

AVANTES: A COMMITMENT TO EXCELLENCE

Avantes' commitment to innovation and excellence is poised to refine the landscape of aluminum recycling. With our advanced spectrometers utilizing [LIBS technology](#), we are proud to drive the industry toward a future where environmental stewardship and economic viability go hand in hand. Together, we shall forge a path towards a more sustainable and circular economy, one aluminum alloy at a time.

[Contact](#) a member of the Avantes team today to find out more.

REFERENCES AND FURTHER READING

1. What is laser-induced breakdown spectroscopy (LIBS)? Avantes <https://www.avantes.com/applications/measurement-techniques/libs/>
2. Laser-Induced Breakdown Spectroscopy Beyond the Lab. Photonics Spectra https://www.photonics.com/Articles/Laser-Induced_Breakdown_Spectroscopy_Beyond_the/a63192
3. Edward, H. & Zhou, W. Laser-Induced Breakdown Spectroscopy Combined with Nonlinear Manifold Learning for Improvement Aluminum Alloy Classification Accuracy. Sensors (Basel). 22, 3129 (2022).
4. Empowering Spectroscopy Solutions. Avantes <https://www.avantes.com/>
5. Infinitely Recyclable. The Aluminum Association <https://www.aluminum.org/Recycling>

CONTACT

WE'RE HAPPY TO HELP

Curious how spectroscopy will help you reveal answers by measuring all kinds of material in-line, at your production facility, in a lab, or in the field? Visit our [website](#) or contact one of our technical experts. We are happy to help you!

Avantes Headquarters

Phone: +31 (0) 313 670 170
Email: info@avantes.com
Website: www.avantes.com

Avantes Inc.

Phone: +1 (303) 410 866 8
Email: infousa@avantes.com
Website: www.avantesUSA.com

Avantes China

Phone: +86 (0) 108 457 404 5
Email: info@avantes.com.cn
Website: www.avantes.cn

Follow us on social media:

