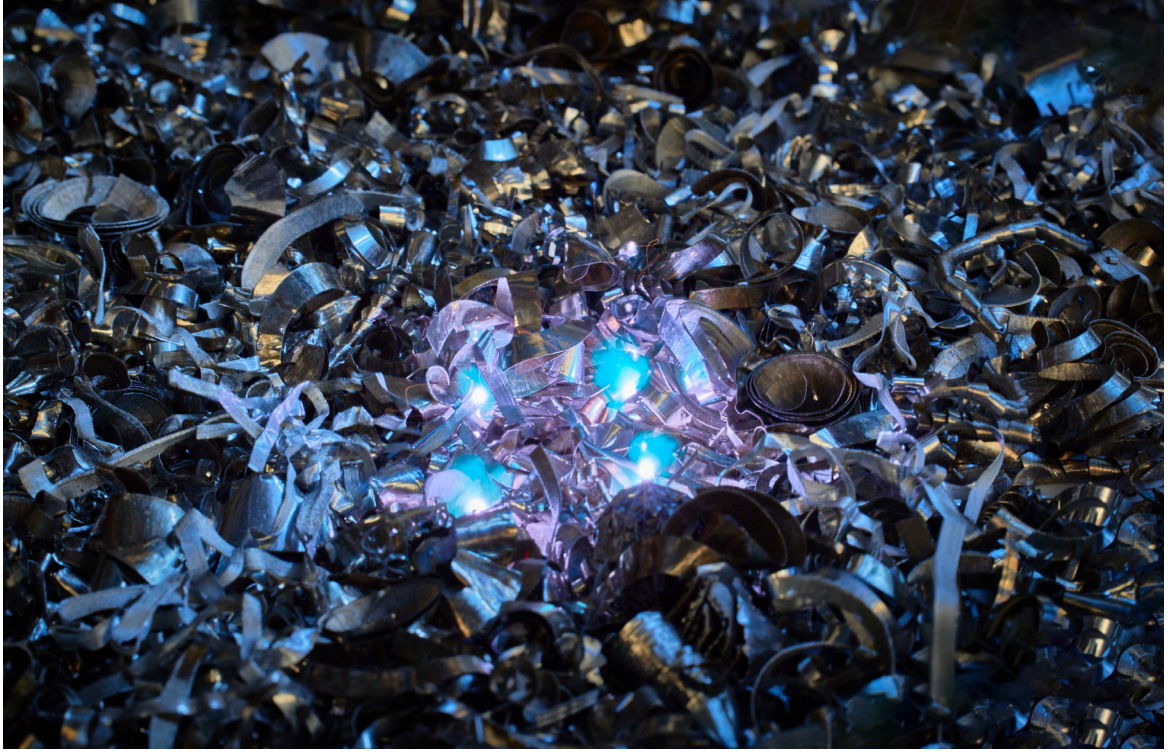

1 LIBS measurements of steel chips.

Inline LIBS sensor in the metal recycling industry

To extract metals from geological deposits, the mining industry consumes a significant proportion of global resources and energy. There is enormous potential to save on these resources when secondary materials containing such metals are recovered and then reused for production. To do this efficiently, the recycling industry, however, needs to know the composition of the input material to efficiently control the remelting process. Isolated scrap parts can be analyzed quickly and accurately using laser-induced breakdown spectroscopy (LIBS) and sorted according to metal types and even individual alloys. Fraunhofer ILT has been instrumental in developing the technology required for this in recent years. However, there are a large number of materials that are not suitable for automatic sorting.

Monitoring variable material flows

In collaboration with project partners, Fraunhofer ILT has developed and tested a LIBS sensor for use in existing recycling processes. The institute has combined the continuous automatic sampling by the LIBS process with upstream optical geometry detection. By intelligently evaluating the surface structure, the sensor distribute a grid of measuring points across the material in such a way that each laser pulse can be applied in a targeted manner and the material's composition recorded as representatively as possible.

Testing in the metal industry

The developed inline LIBS sensor has already been successfully tested in companies that melt down scrap material on an industrial scale to recover the base metals steel, aluminum and lead. As the system quickly records the composition of fine-grained bulk materials, e.g. in transport containers or on conveyor belts, it can chemically characterize the diverse metallic and metal-containing input materials such as slag directly upon delivery and then sort them together – based on scrap-mix optimization models – for the furnace process.

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