



## Chemical Depth Profiling of Galvanized Plastic in the Automotive Industry and Beyond

### Challenges

The automotive industry is continuously innovating, with materials like galvanized plastic gaining popularity due to their unique combination of metal-like aesthetics and plastic-like versatility. However, ensuring the quality and performance of these materials presents a challenge. The materials must meet strict industry standards, and traditional testing methods can often be slow and complex, making it difficult to efficiently verify the integrity of the materials and ensure long-lasting performance.



### Solution



**Laser-Induced Breakdown Spectroscopy (LIBS)** offers an advanced and efficient solution for ensuring the quality of materials like galvanized plastic. By utilizing chemical depth profiling, **LIBS** enables precise analysis of the material's composition and the integrity of the galvanized layer. With **Sci-Trace**, this process is fast and highly accurate, providing detailed results in just 60 seconds as shown in Figure 1.

### Results

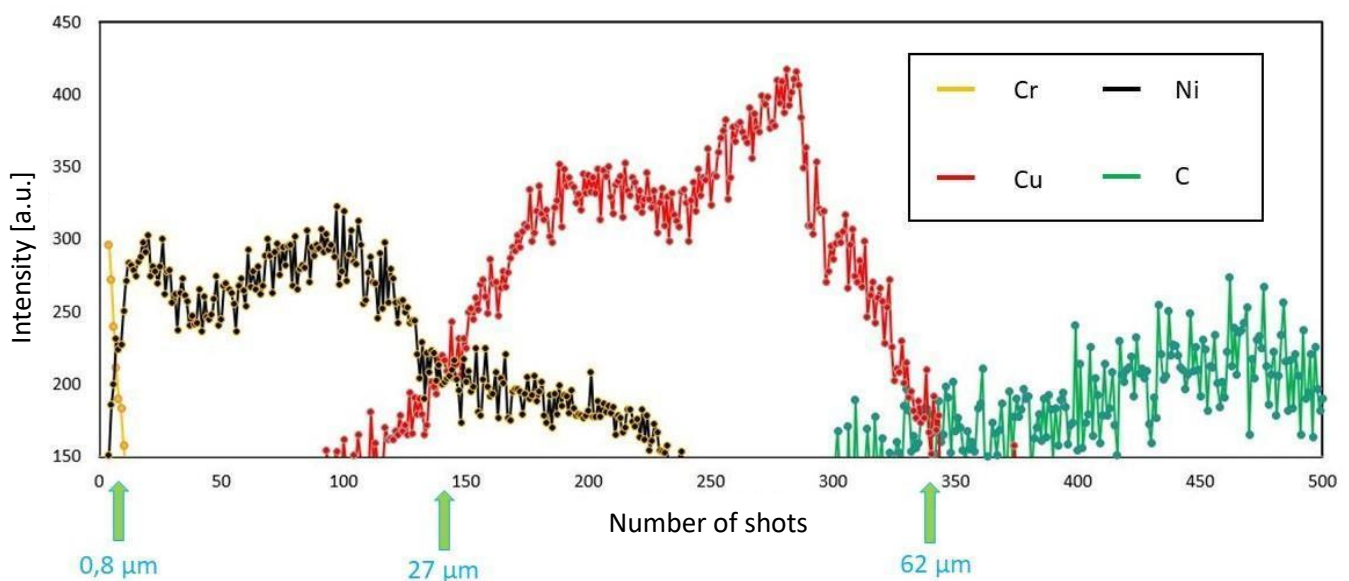


Figure 1: Depth profile of specific elements

Metallic element	Layer thickness [ $\mu\text{m}$ ]
Cr	0,80
Ni	26,2
Cu	35,0

- High Spatial Resolution:** LIBS provides exceptional spatial resolution, making it ideal for examining the composition of individual layers in galvanized plastic. This is especially important when you need to verify the thickness and uniformity of the chromium coating or the presence of any impurities or contaminants.
- Micro-Destructive:** Unlike some other analytical techniques, LIBS is micro-destructive. It doesn't destroy the sample during analysis, ensuring the integrity of the material is preserved for further testing or use. Thus, only small, non-visible surfaces of manufactured products are needed for testing.
- Real-Time Analysis:** LIBS offers real-time results, making it efficient for quality control in manufacturing processes. This is crucial for the automotive industry where consistent quality is paramount.
- Multi-Element Analysis:** LIBS can simultaneously analyze multiple elements, which is advantageous when you need to assess the composition of complex materials like galvanized plastic.

## LIBS Principles

**Laser Induced Breakdown Spectroscopy (LIBS)** is an optical emission tool for the quick characterization of chemical elements in a broad range of materials, including biological, geological, and ceramic materials. A highly energetic laser pulse is directed at the target sample (Figure 2), resulting in the creation of an expanding microplasma upon impact. This microplasma emits luminous species that provide valuable information about the material composition and the sample environment.

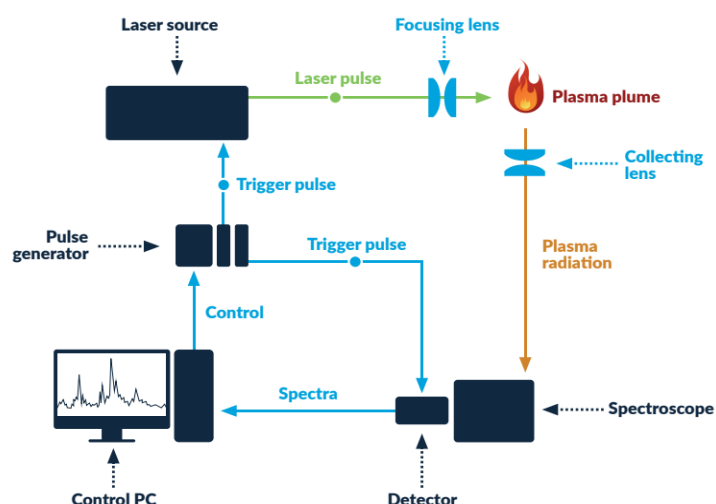


Figure 2: Sci-Trace LIBS set-up scheme