

## **Air-Based vs Argon-Purged LIBS: Why Measurement Conditions Matter**

### **Air-Based LIBS: Built for Speed and Simplicity**

Air-based **LIBS** systems operate directly in ambient conditions, making them quick to deploy and easy to use. For applications focused on rapid identification and high-throughput sorting, this approach is effective and widely used.

However, operating in open air introduces variables that cannot be controlled.

Oxygen and nitrogen in the atmosphere interact with the plasma, influencing signal quality and making certain measurements — particularly carbon — more complex and less consistent.

Best suited for:

- Rapid alloy identification
- Scrap sorting and verification
- High-throughput inspections

### **Argon-Purged LIBS: Engineered for Reliable Results**

**Argon-purged LIBS** systems create a controlled environment around the plasma, significantly reducing the influence of atmospheric gases.

This isn't a small improvement — it's a fundamental shift in measurement conditions.

By stabilising the plasma and improving signal clarity, argon purge enables more consistent, repeatable, and dependable results, particularly when analysing elements that are difficult to measure in ambient air.

Why it matters:

- Minimises interference from oxygen and nitrogen
- Improves plasma stability and signal strength
- Enhances repeatability across measurements
- Supports more reliable carbon analysis in real-world conditions

### **The Real Difference: Convenience vs Confidence**

Both approaches can deliver fast results.

But when the decision you're making depends on the accuracy of that result, the gap becomes clear.

### Comparison Table:

Feature	Air-Based LIBS	Argon-Purged LIBS
Portability	High	High (uses small internal cartridges)
Detection Limit	Higher (less sensitive for trace elements), approx. 300-800 ppm C	Lower (down to 20ppm C)
Speed	Fast (<1 second)	Fast (~1-2 seconds including purge)
Spectral Signal	Weaker; subject to atmospheric absorption	Enhanced by <b>2x to 10x</b> due to plasma confinement
Atmospheric Noise	High interference from nitrogen and oxygen	Argon "shields" the plasma from air contaminants
Consumables	None	Requires argon
Common Use	Quick sorting, basic grade ID	Precise carbon and CE measurements. Can be used for quick sorting and basic grade ID.

### Where CALIBUS Stands Apart

The **CALIBUS LIBS** analyser range is designed for users who need more than just a quick answer — they need an answer they can trust.

By combining true portability with an argon-purged measurement environment, **CALIBUS** enables:

- Confident material verification
- Improved consistency across operators and conditions
- Reduced risk of misidentification or costly errors

This makes it particularly valuable in applications where carbon content and material integrity directly impact performance, safety, or compliance.

## **The Bottom Line**

Air-based **LIBS** delivers speed and simplicity — and for basic identification tasks, that may be enough.

But when accuracy, repeatability, and confidence are critical, measurement conditions cannot be left to chance.

**Argon-purged LIBS** provides the controlled environment needed to deliver more reliable results — especially for challenging elements like carbon.

For professionals making real-world decisions on the shop floor, in the field, or in quality control, that difference isn't marginal.

It's essential.

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