

Analysis of Oxygen (O) and Nitrogen (N) in Metal 3D Printer Materials

Background / Challenges - Oxygen and Nitrogen can cause failures to printed metals -

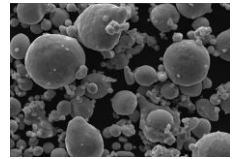
Background

Metal 3D printing is already used for creating prototypes in a wide range of fields, and it is now being studied for use in mass production. Stainless steel, Ti, Al, and Cu are commonly used as metal 3D printing materials, and customers have expressed a desire to be able to quickly manage the amounts of oxygen (O) and nitrogen (N) in those materials.

For example, if the Ti material contains a large amount of oxygen (O), oxides will be produced, which can lead to defects in the printed part. Similarly, if the Ti material contains a large amount of nitrogen (N), structural defects, such as cracks, will easily occur.

Challenges

Quantitative analysis of oxygen in materials science is challenging. There are few techniques available, and some can only detect oxygen compounds. The shape of the sample to be measured is also limited. In addition, exposure to air can cause nitrogen and oxygen to adhere to the sample, leading to measurement errors. To accurately quantify a large number of samples without air influence, it is essential to use a rapid analysis system and a pre-treatment that reduces air influence.



A SEM image of Ti alloy powder

Solution from HORIBA

A testimonial from a 3D printing material manufacturer

“Oxygen (O) and nitrogen (N) in Ti material can be analyzed in just a few minutes. It helped us determine the number of times to recycle the powder after molding.”



Oxygen (O) and nitrogen (N) in metal powders can be analyzed just in a few minutes.

Sample weight [g]	Oxygen [mass %]	Nitrogen [mass %]
0.0504	0.0739	0.0114
0.0503	0.0718	0.0153
0.0506	0.0725	0.0171
Average	0.0727	0.0146

Table 1. Analysis results for oxygen (O) and nitrogen (N) in Ti material

Sample sealing equipment (FP-30)



Our special sample sealing equipment (FP-30) enables sealing a sample in a short time and protects against atmospheric exposure.



Ni sample capsule



After sealing the sample

Option: the Auto Sampler for the EMGA Series

Guarantees the accuracy of measurement results and avoids physical strain on operators

- Maximized accuracy and reproducibility**
 Minimizes human errors and ambient dust contamination, resulting in precise and consistent results.
- Enhanced safety**
 Standard equipment with safety covers reduce the risk of injury and sample contamination
- Improved productivity and reduction of operator workload**
 It facilitates more efficient operation and sample handling, resulting in reduced processing time and increased sample throughput.



Auto Sampler Unit with turntable



The turntable allows for the placement of up to 22 samples, including fluxes. An interlock is provided to protect the samples during measurement.

Watch the actual operation and performance in the video



[Product Website](#)



[Inquiry Form](#)