DATA BULLETIN

elementar
EXCELLENCE IN ELEMENTS

Carbon and sulfur analysis in metal powders for 3D printing

More and more metallic parts are produced via 3D printing. This new technology offers completely new opportunities regarding complex geometries, which have never before been thinkable to produce. Moreover, prototypes can be realized from technical drawings without building tailored tools. The quality of 3D printed parts is strongly influenced by the quality of the raw materials. In order to reduce production costs, powders are often recycled. However, after multiple uses the carbon and sulfur concentrations and the related mechanical properties can be altered. Therefore, it is important to monitor the carbon and sulfur concentrations of the metal powders in order to ensure high quality, 3D printed parts.

Various alloys, which are used for 3D printing are analyzed on the inductar® CS cube. Depending on the interaction of these metals with the electromagnetic field, different accelerators are recommendable. In these measurements, we applied a blend of EXACC WS (2 g) and EXACC FE (0.5 g) for sample masses between 250 and 500 mg. The results of the combustion analysis are shown in the following table.

MATERIAL	C [ppm]	SD	S [ppm]	SD
Titanium	157	4	< 1	n.a.
Stainless steel	14	3	39	2
Stainless steel recycled	28	4	41	2
CoCrMo	829	14	25	1
CoCrMo recycled	846	6	26	2

Raw materials and recycled powders vary little in their carbon concentrations. Nevertheless, even variations in the ppm range can change the properties. Thus, it is important to apply an analytical method which shows a high accuracy and low limit of detection. Elemental analysis by the inductar CS cube is the method of choice for such applications.

INSTRUMENT:
inductar® CS cube

DETAILS:
carrier gas: oxygen
sample: 250 - 500 mg metal powder

STANDARDS:
ASTM E1019, ISO 15349-2, ISO 15350

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08 / 2018 A