

Determination of the hydrogen concentration in titanium and its alloys

Titanium and its alloys are of continuously increasing importance for various applications, such as light-weight construction, medical tooling and prosthetics. Due to its great bio-compatible properties, the use of titanium in prostheses for the artificial replacement of hip or knee joints is constantly increasing. Additionally, the fact that titanium is light-weight but also high-strength makes it interesting for many future applications. Titanium can be manufactured additively, which is an important factor for the customization approach in the medical industry. The presence of dissolved hydrogen in titanium massively decreases the mechanical stability due to embrittlement and thus needs to be determined and controlled.

Different titanium powders were analyzed using the inductar® ONH cube. The samples were weighed in nickel capsules, placed inside a graphite crucible, using a sample weight between 100 and 200 mg. It is recommended to close the nickel capsules with a capsule press.

MATERIAL	H [ppm]	SD	REFERENCE H [ppm]
2453a	127	2	127
2454	208	2	211
3609	14	1	16
352a	21	1	20

The results presented in the table above illustrate the high accuracy of the measurement, as well as the excellent reproducibility of the analyzer. Not only hydrogen, but also nitrogen and oxygen can be determined simultaneously within one analysis for the same sample. This extra information could also be of interest for several applications.

INSTRUMENT:

inductar® ONH cube

DETAILS:

carrier gas: helium

sample: 100-200 mg titanium powder



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