

ISE Heilstättenweg 49 41169 Mönchengladbach Germany

Name 1

Name 2

Adresse 1

Adresse 2

Country

Mönchengladbach, 21.08.2019

**Analysis of copper powder for chemical purity and copper isotope distribution.
Your order of 20th August 2019.**

Analysis report # 0001908001

Dear Madam, dear Sir,

according to above mentioned order we have analysed a sample of your commodity, received at Institut für seltene Erden und Metalle, on 20th August 2019 for the chemical purity and isotopic composition.

The sample was designated as:

**Copper powder PMU type
Lot ID: xxxxxx, Box ID: xxx-xxx
Sample ID: 201909000995**

According to the attached analytical report, the chemical purity grade of the copper powder is:

**Copper: >99.999% - based on sum of metallic impurities
See attached analytical report**

The atomic fraction of the copper isotopes ⁶³Cu and ⁶⁵Cu corresponds to natural isotopic abundance.

The analytical report is attached to this letter.

If you have questions about the results, please feel free to contact us.

Yours sincerely

Institut für seltene Erden und Metalle
Arndt Uhlendorff

Name 1
Name 2
Adresse 1
Adresse 2

Dr. Myint Myint Sein
ELMASPECS / ISE Laboratory
Frankenseite 74-76
47877 Willich

Country

Willich, 20.10.2019

Analytic certificate #201909001

GD-MS Analytic according to ISO/TS 15338:2009

Your order of:	30th october 2019	Your order ID:	201909001
Material according: to customer	Copper powder 99.999%	Your Sample ID:	2019000995
Date of sample input:	30th October 2019	ELM-Laboratory ID:	2019-0030

Results of the analysis on page 3

GDMS

Analytical Report

Customer: Name 1
Date: 30th october 2019

Analytic ID: 201909001
Sample ID: 2019000995

Element	Mass fraction ppm
Li	<0.001
Be	<0.001
B	<0.001
C	n.d.
N	n.d.
O	n.d.
F	0.015
Na	0.009
Mg	0.001
Al	0.001
Si	0.015
P	0.003
S	0.369
Cl	0.017
K	0.020
Ca	<0.001
Sc	<0.001
Ti	0.005
V	0.001
Cr	0.002
Mn	<0.001
Fe	0.019
Co	<0.001
Ni	0.002
Cu	Matrix
Zn	0.001
Ga	<0.001
Ge	0.55
As	0.004
Se	<0.002
Br	0.017
Rb	<0.001
Sr	<0.001
Y	<0.001
Zr	<0.001
Nb	<0.001
Mo	0.001
Ru	<0.001

Element	Mass fraction ppm
Pd	<0.001
Ag	0.14
Cd	<0.005
In	0.017
Sn	0.001
Sb	0.005
Te	0.001
I	<0.001
Cs	<0.001
Ba	<0.001
La	<0.001
Ce	<0.001
Pr	<0.001
Nd	<0.001
Sm	<0.001
Eu	<0.001
Gd	<0.001
Tb	<0.001
Dy	<0.001
Ho	<0.001
Er	<0.001
Tm	<0.001
Yb	<0.001
Lu	<0.001
Hf	<0.001
Ta	0.001
W	0.006
Re	<0.001
Os	<0.001
Ir	<0.001
Pt	0.015
Au	0.163
Hg	<0.001
Tl	<0.001
Pb	0.005
Bi	<0.001
Th	<0.001
U	<0.001

n.d. = not determined

Total impurities: 0.918 ppm (Cu remaining) = 99.99991%