Precious Metal, Coins and Bullions

REAL or FAKED?

Testing non-destructively and quickly using the

SIGMASCOPE® GOLD

Testing the genuineness using electrical conductivity

Because of the price explosion in precious metals, the production of counterfeit gold and silver goods has developed into a booming industry. Lately, more and more counterfeit coins and bullions have surfaced. This has led to uncertainty in the market and many investors have become leery. Institutional and private investors want to be certain that they do not invest their assets in counterfeit coins or bullions. With FISCHER measuring instruments, you will find any imitation – quickly, reliably and non-destructively.

Destructive methods for testing the genuineness lead to a loss of value. With the product lines SIGMASCOPE GOLD and X-RAY, FISCHER offers two non-destructive methods that complement each other perfectly when the genuineness of precious metal coins and bullions needs to be tested quickly and accurately.

The SIGMASCOPE GOLD detect counterfeit precious metal bullions and coins via electrical conductivity. They utilise the physical fact that various alloys and fine gold differ in their conductivity.

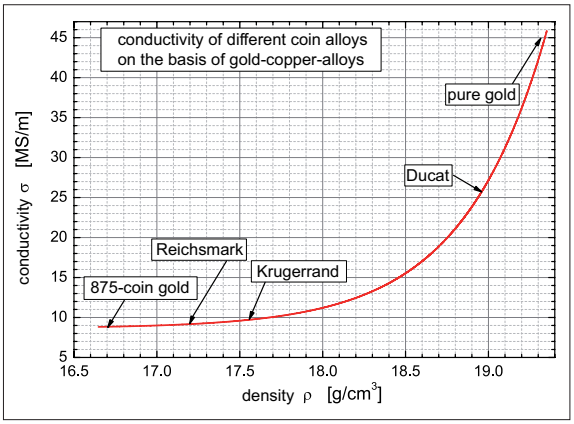
The instruments of the X-RAY product line operate according to the X-ray fluorescence analysis (XRFA) method and can determine the composition of jewellery, coins, bullions and other items quickly.

Electrical conductivity measurement on coins – fast and reliable even under foils

Conductivity measurement using SIGMASCOPE GOLD
The electrical conductivity of gold bullions and of all common coins is known. Counterfeits have inclusions on the inside, made, for example, of tungsten. These inclusions change the electrical conductivity significantly. Thus, using a comparative measurement of the electrical conductivity allows for a reliable, quick and non-destructive identification of counterfeits.

With the SIGMASCOPE GOLD, FISCHER offers instruments that are ideally suited for determining the conductivity from precious metal coins up to large gold bullions. The instruments work non-destructively and utilise the eddy current method according to DIN ISO 21968. The phase-sensitive measurement signal evaluation allows for contact-free determination of the electrical conductivity even under non-conducting top layers such as plastic packaging. The penetration depth of the eddy currents can be selected corresponding to the thickness of the specimen.

Testing of coins
The SIGMASCOPE GOLD can precisely measure the conductivity of coins. The following diagram shows the conductivities and the densities of various gold coins, which differ in the composition of their alloys and therefore in their electrical conductivity.



Electrical conductivity – a positive indicator for genuineness

Valuable precious metal coins are made of precisely defined alloys. The respective corresponding electrical conductivity values are known as well:

- Ducat: 25.4 MS/m
- Krugerrand: 9.7 MS/m
- 875 coin gold: 8.0 MS/m

Thus, the genuineness can be tested reliably using the electrical conductivity.

Schematic drawing of counterfeit coins with embedded powder of a tungsten-based foreign alloy and gold coating

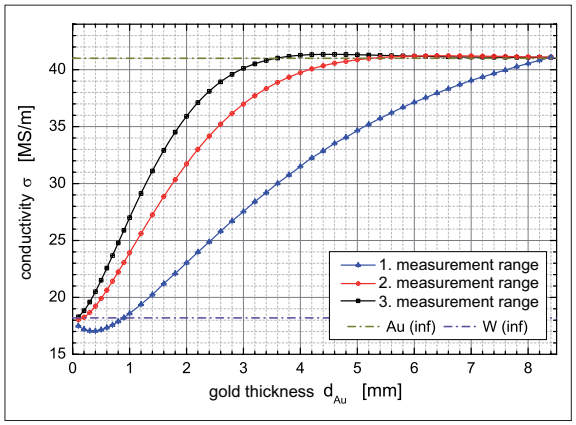
Testing bullions up to 1 kg

The SIGMASCOPE GOLD can determine the electrical conductivity of bullions up to approx. 1 kg in weight. When making measurements on both sides, the entire depth of the bullions can be measured and the genuineness of the alloy or of the fine gold can be tested. Even hidden enclosures of non-precious metals with a comparable density (e.g., tungsten) can be detected unambiguously with the SIGMASCOPE GOLD and identified as counterfeits.

Schematic diagram of a counterfeit gold bar with embedded tungsten rods and gold cover

Three measurement ranges for different penetration dephts

The SIGMASCOPE GOLD operates with three measurement ranges for different penetration depths. A penetration depth to the center of the bar is necessary in order to detect smaller inclusions in the core of the bar. At the same time, the penetration depth must not exceed the entire thickness of the bar in order to prevent the underlying material (e.g., of a tabletop) to influence the measurement signal. The diagram below shows: Measurement range 1 has a penetration depth of approx. 8 mm, which corresponds to the minimum bar thickness. To detect foreign material in the center of the bar using double-sided measurements, its thickness must not exceed 17 mm.



For every bullion size the correct penetration depth to measure the electrical conductivity

Testing a fine gold bullion – possible even through a protective foil

Measuring the electrical conductivity is a quick and precise method to test the genuineness of valuable items made of precious metals. X-ray fluorescence analysis (XRFA) is a suitable complementary method for an accurate determination of the composition.

Features of the SIGMASCOPE GOLD

- ☐ Reliable determination of the electrical conductivity of coins and bullions
- ☐ Non-destructive test method
- ☐ Measurements within seconds
- ☐ Positive recognition of counterfeits
- ☐ For testing coins and bullions up to 1 kg

Exact determination of the alloy composition

FISCHERSCOPE® X-RAY XAN® 220 for high-precision analysis of gold and pieces of jewellery

As a complementary method to the electrical conductivity measurement, X-ray fluorescence analysis (XRFA) determines accurately the composition of precious metal pieces - quickly and non-destructively.

While the electrical conductivity is ideally suited to detect foreign inclusions inside an object, it cannot provide information about all elements contained in an alloy. This is exactly where the X-ray fluorescence analysis (XRFA) picks up. It has taken root as a particularly precise, reliable and, above all, non-destructive method for near-surface materials analysis and coating thickness measurements for gold and jewellery items.

Measuring instruments must meet the highest demands especially for refiners and assayers of precious metals. Not only the verification of the gold content but also the determination of the complete composition of the constituent elements is important.

It is additionally possible to detect undesirable elements such as nickel, cadmium and lead. The FISCHERSCOPE® X-RAY XAN® product line allows for the precise measurement of all these elements using the XRFA method.

In addition to the flexible high-end measuring system XAN 250, FISCHER offers the right instrument for any customer, a robust entry-level instrument, the XAN 215, and the high-precision standard system XAN 220. All measuring instruments excel through quick and simple operation plus excellent long-term stability. The instruments employing a silicon drift detector (XAN 220 and 250) achieve repeatability precisions of 0.3 ‰ or better and are thus comparable to cupellation. To ensure the trueness of the measurements, FISCHER also produces high-quality, traceable calibration standards in house according to the most stringent quality standards.

www.goldanalysis.com
www.helmut-fischer.com

912026 05/13