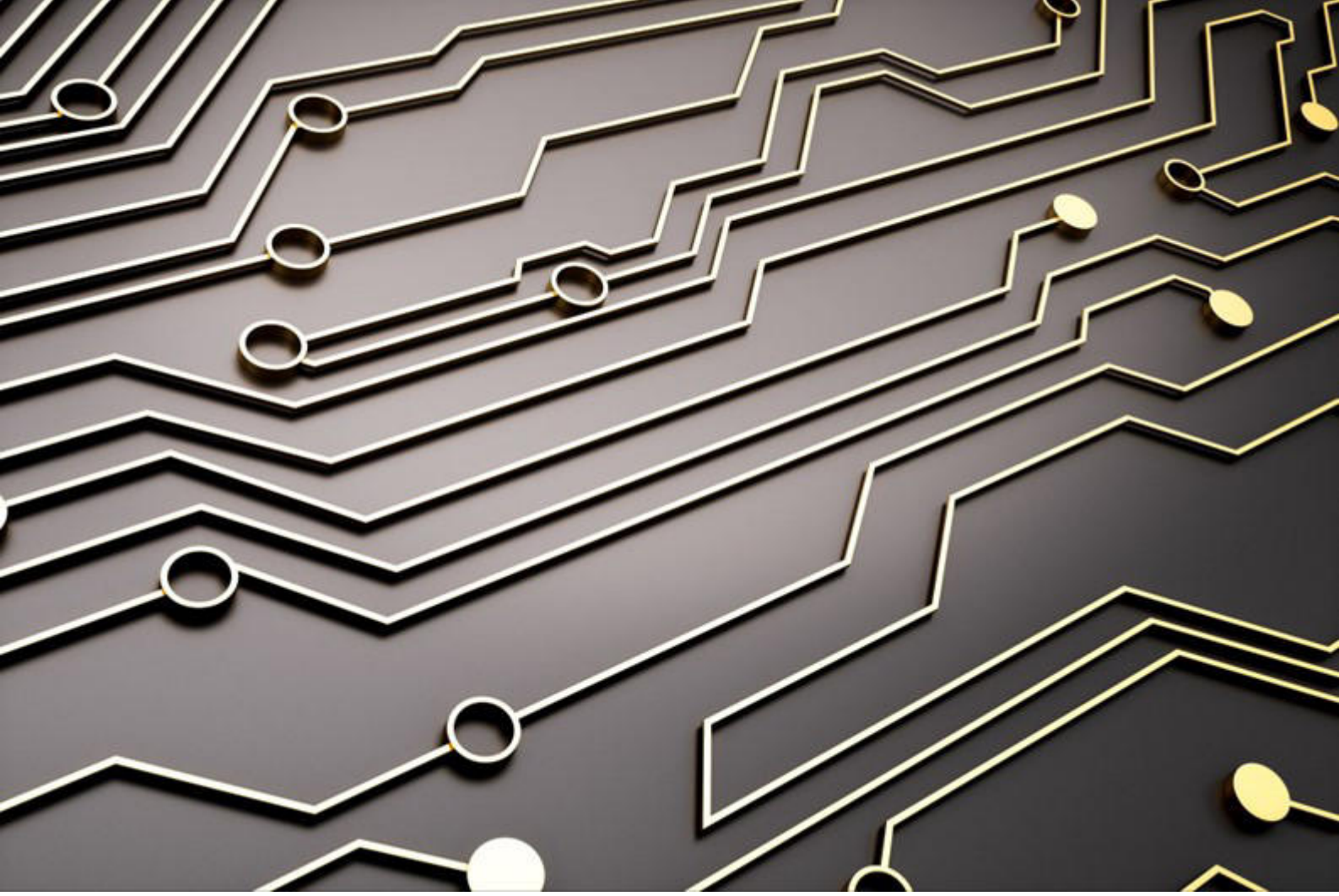

Application Note AN-V-236

Antimony stabilizer in an electroless Ni bath

Straightforward determination of Sb(III) over a wide concentration range with the scTRACE Gold

Electroless nickel plating offers excellent wear and corrosion resistance. Producing printed circuit boards begins with electroless nickel coating, either via the ENIG (electroless nickel, immersion gold) or ENEPIG (electroless nickel, electroless palladium, immersion gold) process. Monitoring the stabilizer levels in electroless Ni plating baths is crucial to ensure uniform nickel deposits and high-quality coatings. The typical concentration of antimony(III) stabilizer in an electroless Ni bath is around 1 mg/L.

Anodic stripping voltammetry is a fast and robust tool for monitoring the Sb(III) stabilizer concentration in electroless Ni plating bath samples. This determination is performed on a combined sensor containing working, reference, and auxiliary electrodes integrated on a single ceramic substrate: the scTRACE Gold. The sensor does not need extensive maintenance such as mechanical polishing. This method is suited for manual or automated systems.

SAMPLE

Electroless Ni plating bath

EXPERIMENTAL

Add water, the electroless Ni plating bath sample, and the supporting electrolyte into the measuring vessel. The determination of antimony(III) is carried out with the 884 Professional VA (Figure 1) using the parameters specified in Table 1. The concentration is determined by two additions of an antimony(III) standard addition solution.

The scTRACE Gold is electrochemically activated prior to the first determination.

Figure 1. 884 Professional VA, fully automated for VA analysis.

Table 1. Parameters

Parameter	Setting
Mode	DP – Differential Pulse
Deposition potential	-0.1 V
Deposition time	30 s
Start potential	-0.1 V
End potential	0.2 V
Peak potential Sb(III)	0.06 V

ELECTRODES

- scTRACE Gold

RESULTS

With a 30 s deposition time, this method is suitable for the determination of antimony(III) in electroless Ni plating bath samples over a wide concentration range when the dilution factor is adapted.

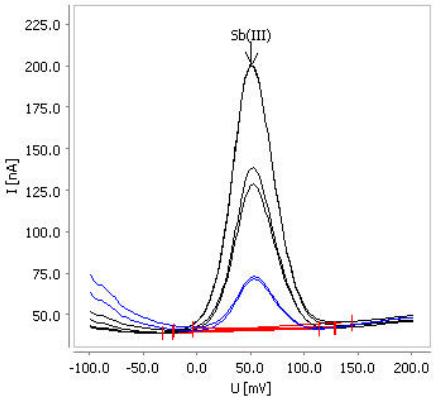

Figure 2. Determination of antimony(III) in an electroless Ni bath sample containing 1 mg/L Sb(III) (30 s deposition time, sample volume 25 µL in 10 mL water).

Table 2. Result

Sample	Sb(III) (mg/L)
Electroless Ni plating bath containing 1 mg/L Sb(III)	0.971

Internal reference: AW VA CH-0619-122022

CONTACT

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CONFIGURATION

884 Professional VA manual for Multi-Mode Electrode (MME)

884 Professional VA manual for Multi-Mode Electrode (MME) is the entry-level instrument for high-end trace analysis with voltammetry and polarography with the Multi-Mode Electrode pro or the scTRACE Gold or the Bismuth drop electrode. The proven Metrohm electrode methods in combination with a high-performance potentiostat/galvanostat and the extremely flexible viva software open up new perspectives for the determination of heavy metals. The potentiostat with a certified calibrator readjusts itself automatically before each measurement, thus guaranteeing maximum precision.

Determinations with rotating disc electrodes can also be performed with the instrument, e.g. determinations of organic additives in electroplating baths with "Cyclic Voltammetric Stripping" (CVS), "Cyclic Pulse Voltammetric Stripping" (CPVS), and chronopotentiometry (CP). The replaceable measuring head enables rapid changes between the various applications with different electrodes.

The viva software is required for control, data collection, and evaluation.

The 884 Professional VA manual for MME is supplied with extensive accessories and a measuring head for the Multi-Mode Electrode pro. Electrode set and viva license need to be ordered separately.