Background

The goal of this study was to accurately read the Ni layer under a thick layer of Au in a Au/Ni/Base calibration.

Thick Au coatings over Ni plating is a popular application for industries that manufacture connectors and contacts. For this application, it is important to obtain accurate thickness measurements for both layers.

As what happens with Au/Ni, when topcoats of dense material approach higher thicknesses, photons emitting from an underlying low energy element (Ni Kα: 7.48KeV) will be absorbed by that top layer and therefore not reach the detector to be counted.

Instrumentation

Models:
Bowman BA100

Excitation:
Collimated system, 12mil

X-ray tube:
W target

Detector:
SiPIN and 70mm² LSDD
Sample Preparation
No samples were used in this exercise. Rather, a calibration was built with INFs (Au, Ni, Cu). Three two-layer, standard calibration points were used to determine accuracy and repeatability.

Calibration
Fundamental parameter calibration was built with certified standards (45kV, 0.9mA, 0.1mmPF, 0.25inFD):
- 41µinAu/199µinNi/Kovar (Fe 55.09%, Ni 27.64%, Co 17.27%)
- 84.5µinAu/153.3µinNi/Kovar (Fe 55.09%, Ni 27.64%, Co 17.27%)
- 113µinAu/100µinNi/Kovar (Fe 55.09%, Ni 27.64%, Co 17.27%)

Precision
Instrument repeatability is determined by 30 repeat analyses of a sample in static position, using 60 sec and 100 sec measurements for each analysis. Results are summarized here.

SiPIN: 30 sec measurement time:

| 30 measurements of Au/Ni %P, 30 sec |
|-----------------------------|-----------------------------|
|                              | Au /µin | Ni / µin |
| Labeled Value               | 84.5    | 199      |
| Average Value               | 84.18   | 202.77   |
| Std. Dev.                   | 0.536   | 6.110    |

LSDD: 30 sec measurement time:

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<th>30 measurements of Au/Ni, 30 sec</th>
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<td>Average Value</td>
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Conclusions
Using both the SiPIN and LSDD, the tracking standard combination yielded excellent results. With the LSDD’s increased window size generating increased count rate and better resolution, standard deviation values are lower.
About Bowman

Founded in 2009, with a headquarters campus in the Chicago suburb of Schaumburg, Illinois, Bowman is the only major manufacturer of XRF coating measurement systems with design, development and manufacturing all in the USA.

Bowman is a leading exporter of XRF systems, with a well-established customer base in Mexico and Germany, as well as Italy, Japan, India, Korea, China, Taiwan, Singapore, Thailand, Malaysia, France, UK, and the Philippines.

Bowman is exclusively focused on XRF technology.

The company:

➤ Is well-established, with more than 1000 units installed worldwide since 2014.

➤ Has a worldwide service partnership: 200+ certified technicians who are qualified to service and repair all 7 Bowman units, as well as benchtop XRF systems manufactured by other suppliers.

➤ Boasts impressive management credentials: Bowman ownership, managers and engineers are all alumni of CMI International, an early leader in XRF plating measurement technology, established in 1985.