VEM Ultra-Pure Gold (UP Au™) Evaporation Materials – Improves Yield and Production Uptime

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Introduction

Gold defects are a common problem during metal deposition by evaporation. Small gold droplets, often referred to as spits, can be discharged from the molten source during the the evaporation process that solidify into particles on the wafer. If these particles land on a structure, it can result in a microelectronic short circuit and possibly result in loss of wafer lots.

In response to customer needs, VEM has developed a proprietary, proven manufacturing process that eliminates more contaminants that cause spitting from gold material.

UP Au Evaporation Materials

VEM Ultra-Pure Au evaporation materials enable PVD users to:

- Minimize spitting by reducing carbon and other contaminants
- Improve yield
- Increase production uptime

Our proprietary process extracts more contaminants that cause spitting from the gold material. Often the contaminant is observed as a carbonaceous film that leads to spitting and particle generation. Using several unique post fabrication processes enables VEM to offer exceptionally pure sources that have minimal residue and surface contamination. Ease of use, minimal conditioning and the consistently stable evaporation process are the hallmark of VEM UP Au evaporation materials.

GDMS Analysis of Elemental Impurities – Competitor Pellets Versus VEM Manufactured UP Au Pellets

GDMS (ppm)	Ag	Ca	Cu	Fe	Ge	Mg	Na	Ni	Pb	Pd	Pt	Si	Sn	V	Total
Competition	6.51	0.23	0.06	0.79	0.8	0.03	0.27	0.03	0.004	0.10	0.46	0.08	0.44	0.008	9.812
VEM High Purity	2.90	0.17	1.30	0.09	0.1	0.05	0.29	0.01	0.050	0.14	0.34	0.05	0.05	0.006	5.546
VEM Ultra Pure	1.20	0.05	0.08	0.01	0.1	0.05	0.05	0.01	0.01	0.01	0.1	0.05	0.05	0.005	1.755

*Oxygen - Competition: 4.95ppm VEM HP: 4.95ppm VEM UP: 4.2ppm
Carbon - Competition: 13ppm VEM HP: 10ppm VEM UP: 4.8ppm

- *VEM manufactured 5N Au pellets have less elemental impurities than competitor 5N purity Au*
- *VEM UP Au provides highest purity level*

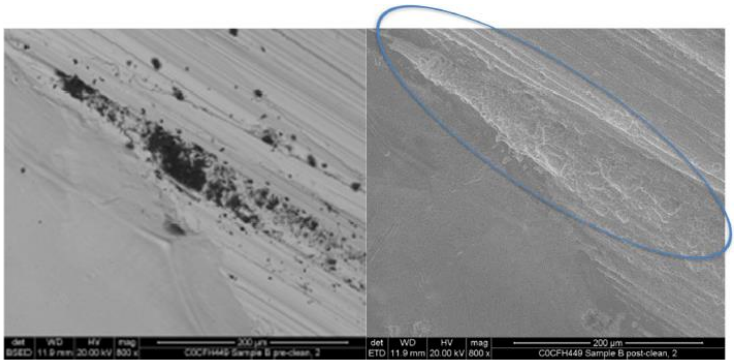
Quality

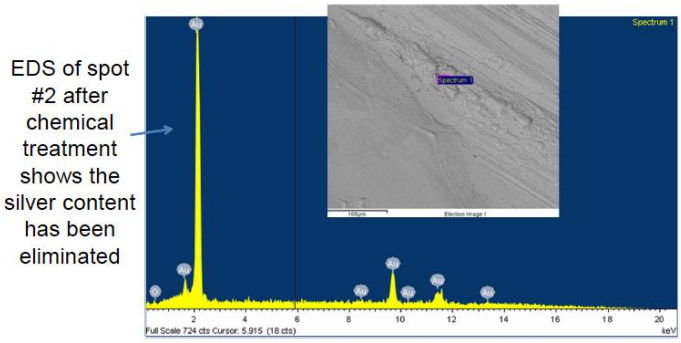
Metallic purity is confirmed by ICP (Inductive Coupled Plasma) and interstitials (C, O, N, and S) by inert gas analysis (IGA). Sample inspection utilizing scanning electron microscopy (SEM) assures ultra-clean surface quality. Results of these evaluations are monitored utilizing ISO certified quality methods and standards.

VEM has one of the most extensive, state-of-the-art, gold manufacturing facilities in the industry. Our manufacturing facility is modeled after semiconductor equipment manufactures and is ISO 9001:2008 certified. Coupling years of process knowledge with leading-edge equipment and in-house analytical capabilities has created a world-class manufacturing facility meeting the needs of thin film producers.

Contamination Eliminated with VEM UP Au

Before Chemical Treatment *After Chemical Treatment*





Analysis

VEM tests for Ag, Al, Be, Ca, Cr, Cu, Fe, Ge, In, Li, Mg, Na, Ni, Pb, Pd, Pt, Rh, Si, Sn, Ti, Zn using ICP-OES (Inductive Coupled Plasma Optical Emission Spectroscopy) with standards to analyze to 1 ppm. The testing requirements are based on typical elements found naturally with Au that refining processes are designed to remove and the customer requirements.

Purity	Trace Metals Spec, GDMS	Other Elements
99.999%	< 10 ppm	C < 10 ppm

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