Nova AncoScene®

Back-End-Of-Line Interconnects Metrology for Damascene Plating



Benefits

- Automated online analysis of inorganics, organic additives and byproducts
- Smallest footprint and fab space
- Simple, convenient front access
- Cu & Acid - non reagent analysis (NRA)
- Connection to all typical plating tools
- Automatic Standard mixing with self-check provisions
- Barcode verification system for bottle changes
- Supports NowPak containers
- Long parts lifetime and refurbishment options for lowest CoO

Low Cost of Ownership

Longer parts lifetime,
Small footprint

Transparent Data Access

User access to all data
Analog and digital fab links

Fully Automated

Accurate, repeatable results
Proven, successful delivery record

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Nova AncoScene® Features

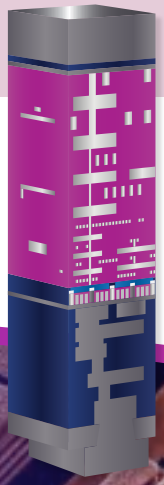
- Supports all copper chemistries
- Optional Bath Health/Performance Indicator
- Precise and validated mixing of Standards
- Safety Standards: SEMI S2/S8, F47, CE
- Communication protocols: TCP-IP, RS-232, SECS/GEM
- Containers: Nowpak ready, Barcode assisted container replacement system
- SW GUI includes: data analysis, logs and reports, graphic SPC and preventive maintenance
- Slip-Streams: up to 4 tanks
- FM-4910 compliant material
- MTBF > 2160 hours; MTTR ~ 2 Hours
- Footprint: 810mm W x 610mm D



Analysis Performance – Cu Damascene

Component	Technique	Accuracy [%]	RSD [%]	Analysis time
Copper	Spectrometry	2	1	Total time 30min*
Sulfuric Acid	Non-Reagent	2	1	
Chloride	Titration	3	2	
Accelerator	CVS	3	2	
Leveler		3	2	
Suppressor		3	2	

* Bath chemistry dependent



NOVA

Nova Ancolyzer®

The Leading Fully Automated Process Control for Advanced Packaging



Flexible, Scalable Tailored to the Application

Leading process control for Advanced Packaging

- Electroplating: Cu, Ni, SnAg, Sn, In and Au
- Electroless (e-Less) plating: e-less Ni and Pd, Immersion Au, e-less Au and Cu
- Pre-treatment for e-less plating: wetter, pre-dip, post-dip, Cu-etch, Ni-activator, Al-etch and Zincation

Flexible, open system architecture

- Full access to collected data
- Enhances characterization, troubleshooting, and process improvement

... characterizes both physical and chemical properties - analyzes **Inorganic** and **Organic** components, **Breakdowns** and also **Bath Performance/Behavior**

Nova Leadership
Know-how in chemical metrology and process control

- Proven leadership in the packaging domain
- Broad range of techniques and methodologies
- Seamless chemical fully automated replenishment, bleed & feed and bath make up

Delivering exceptional value to the end customer

- Controlling chemical costs and waste reduction due to lower chemical consumption
- Longer consumable parts lifetime and refurbishment options for lowest CoO
- Designed for easy field upgradeability

Low Cost of Ownership
Longer parts lifetime,
Efficient footprint

Transparent Data Access
User access to all data
Analog and digital fab links

WLP Best Performance
Accurate, repeatable results
Upgradeable

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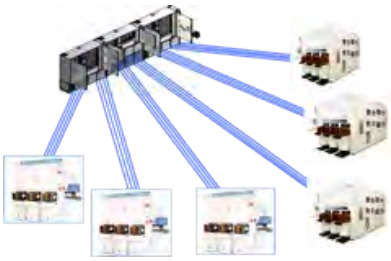
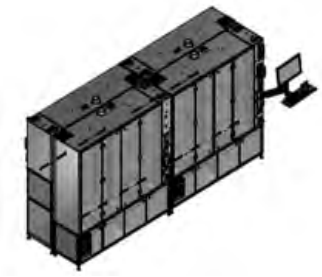
A Family of Automated Process Control Workstations

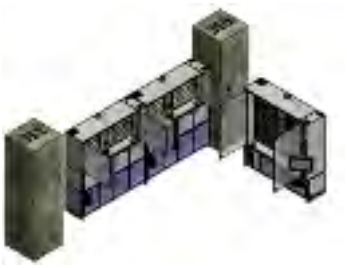
Analysis and dosing systems



Larger complex systems for multiple plating and dosing steps



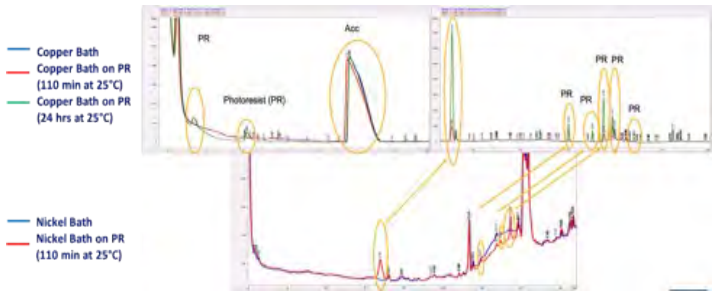
- Up to 5 frames can be combined into one system
- Front access only allows back-to-back positioning



Nova Ancolyzer® Features

- Supports all known chemistries including:
  - Plating: Copper, Tin-Silver, Pure Tin, Nickel and Gold
  - Electroless deposition for Panels and IC-Substrates: Surface preparation (desmear), Electroless Ni, Pd, immersion Au
- The preferred metrology by all major suppliers of Advanced Packaging chemicals
- Analysis of all bath components required for optimal plating
- Intelligent replenishment based on multiple process inputs
  - Replenishment from plating process containers
  - Replenishment from facility bulk
- Seamless DMR integration (CoO lowering solution for low alpha tin/tin silver and Cu plating
- Precise and validated mixing of Standards, Makeup Solutions, dilutions
- Standards: SEMI S2/S8, F47, CE
- Full fab communications support
- Utilizes chemical vendors' containers, Nowpak ready, Barcode assisted
- SW GUI includes data analysis, logs and reports, graphic SPC and preventive maintenance

Bath Lifecycle Contaminants analysis



Nova DMR®

Direct Metal Replenishment for sustainable and cost-effective metal plating



The only clean room ready Metal-oxide replenisher for OSATs and Fabs

Perfectly supplements inert anode processes:

- Improved uptime by reducing the need for periodic anode maintance
- Eliminate issues with plating uniformity at high anode utilization rates such as PLP, RDL, Sn Bumping
- Seamlessly integrated in Ancolyzer system



Reliability

- Economical and shelf stable metal source
- Reliable supply chain by qualified CuO/SnO material vendors

Waste Reduction

- No bath volume increase like with liquid replenishers
- Controlled acid levels mean longer bath life
  Significant decrease of waste volumes during bath operation

Sustainable
Minimizes chemical waste
Longer bath life
Retrofit existing Ancolyzers

Patented Technology
The only Powder Doser for OSATs and Fabs

Cost Savings
Substantial cost reduction for Advanced Packaging applications

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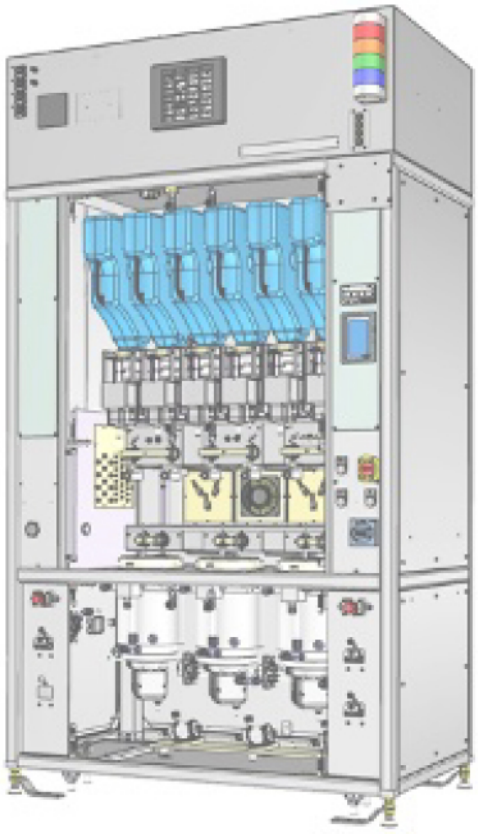
Nova DMR® Features

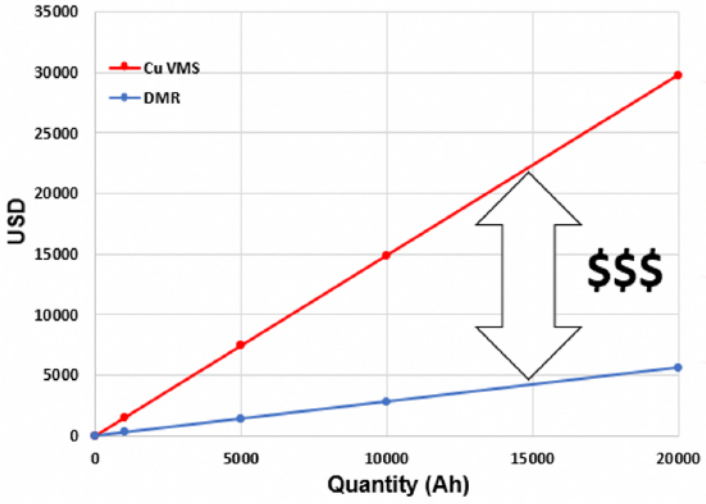
Optimizes High Volume Metal Plating Processes

- **Available for Cu and Sn electroplating baths**
- **Supports up to 3 DMR Stations per frame**
  - One tool can supply multiple platers
  - Increase throughput by merging DMR Stations
  - Parallel supports CuO and SnO stations in one frame
- **High-capacity containers**
  - 10kg CuO: replenish up to 365 g/hr per DMR Station
  - 5kg SnO: replenish up to 225g/hr per station, SnAg and Pure Sn applications
- **Secure material management via Container RFID**
  - CoA Information
  - Material, Lot & Product No.
  - Tracking of Lot history, expiration dates
- **Complies with Safety Standards Semi S2/S8, F47, CE**
- **Multiple qualified material vendors**



Waste volume reduction up to 320L/day*
Up to 70% direct cost savings in Advanced Packaging**

Cu Replenishment by DMR vs. VMS - CoO Calculation



- H_2SO_4 level remains constant on a set level
- Bath volume stays steady without significant increase, thus preventing frequent bleed
- Stable Cu source
- Very long shelf-Life in a solid state

*3x DMR+ station CuO vs. liquid CuSO4 - process dependent
**SULA SnO DMR vs. liquid SnMSA – process dependent

Nova AncoFlex™

Fully Automated Copper Plating Analyzer



Proven Performance in PCB / IC-Substrate Manufacturing Environment with Automatic Verification and Calibration

Supports a broad variety of copper electroplating chemistries

Benefits

Fully Automated Metrology

- Excellent lifetime monitoring of bath composition and performance
- Accuracy and Repeatability – Reported and controlled
- High reliability combined with minimal service needs
- Upgradable to other Copper plating chemistries, as needed

Low Cost of Ownership

- Low Cost of Ownership – long parts lifetime with low PM cost of
- Small footprint, minimal facilities requirements

Data Transparency

- All analysis data and information can be extracted by the user for data analysis

Low Cost of Ownership
Longer parts lifetime,
Small footprint

Transparent Data Access
User access to all data
Analog and digital fab links

Fully Automated
Accurate, repeatable results
Upgradeable

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Nova AncoFlex™ Features

Cu Plating Analyzer – Designed for the PCB industry

- Supports a broad variety of Copper Electroplating (Currently galvanic deposition) Chemistries
- Fully automated analyses of bath components: metal and additives
- Simple operation and maintenance

Minimizes downtime

- Automatic verification (plausibility check) of results
- Auto Calibration with plausibility function
- Analog and Digital communication to process tools and the Fab
  - RS-232, TCP/IP, Analog 4-20 mA

Low Cost of Ownership with a Proven Record

Typical performance in Cu plating processes

Component	Technique	Accuracy (*) [%]	RSD (*) [%]	Analysis time
Copper	Spectrometry	3	2	Total Analysis time < 90 min*)
Acid	Titration	3	2	
Chloride	Titration	3	2	
Accelerator	CVS	7.5	7	
Suppressor	CVS	7.5	7	
Leveler	CVS / Spectroscopy	7.5	7	

* Chemistry dependent