

## Trace Elements in Chemicals and Materials



### Chemical and Material Evaluation Minimizes Process Contamination

Chemical characterization is critical for incoming chemicals for quality control, at the point of distribution (POD) for ensuring that no contamination is contributed to the chemical from the distribution system and at the point of use (POU) for ensuring that contamination is minimized in the bath.

Measurement of plating baths is necessary to ensure consistent plating rates, film uniformity across the wafer and defect-free films. Slight changes in CMP slurry properties can cause great differences in polish performance, directly affecting CMP efficiency and yield.

Balazs<sup>™</sup> Analytical Services utilizes state-of-the-art procedures and instruments to analyze the purity of incoming, POD and POU semiconductor chemicals and materials. Balazs specializes in the application of Inductively Coupled Plasma—Mass Spectrometry (ICP-MS) for ppb/ppt determination of metallic impurities in liquid processing chemicals and solids. Other chemical analyses are performed using appropriate techniques and instruments to characterize chemicals.

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#### **SEMI Critical Element Trace Metal Analysis by ICP-MS for low level and ultra low level reporting limits in:**

- Processing Chemicals
- Etchants (wet and ion)
- Cleaning Chemicals (acids, bases, solvents)
- Photoresist Materials (Resists, Developers, ARCs, etc.)
- Dielectric Materials (TEOS, SOG, Low K, etc.)
- Strippers
- Solvents
- Copper Processing Chemicals
- Selected CMP Slurries
- Performance and other Chemicals

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#### **Turnaround Time**

Standard is < 4 working days 7 priority turnaround time is 3 days for all groups except group 4. Contact your sales manager for turnaround time for group 4 chemicals. Chemicals by group are listed on back.

## Trace Metal Packages

- 16 Elements: Al, B, Ca, Cr, Cu, Fe, Pb, Li, Mg, Mn, Ni, K, Na, Sn, Ti, Zn
- 20 Elements by HR-ICP-MS: Al, As, B, Ba, Ca, Co, Cr, Cu, Fe, K, Li, Mg, Mn, Ni, Na, Pb, Sb, Sn, Ti, Vand Zn
- 30 Elements: 16 elements plus Sb, As, Ba, Be, Cd, Co, Ga, Ge, Au, Mo, Zr, Ag, Sr and V<sup>5</sup>
- 32 Elements by HR-ICP-MS 4: Al, Sb, As, Ba, Be, Bi, B, Cd, Ca, Cr, Co, Cu, Ga, Ge, Fe, Pb, Li, Mg, Mn, Mo, Ni, K, Ag, Na, Sr, Ta, Sn, Ti, W, V, Zn, and Zr<sup>5</sup>
- 35 Elements - 30 SEMI elements plus Bi, Nb, Ta, Tl and Rb<sup>5</sup>
- 50 Elements - 35 SEMI elements plus Cs, In, Ir, La, Hg, Pd, Pt, Rh, Te, Ru, Sc, Se, Th, W and U<sup>5</sup>

## Special Analyses

- Identification of organic impurities in solvents by GC-MS
- Assay by titration or gas chromatography
- Residue on ignition
- Wet bench material qualification program
- Low level anions by IC in chemicals
- Particle Sizing and Counting(0.3µm -10µm)
- In-house studies

## Other Support Services

- Chemical Sampling Kit with pre-cleaned bottles
- Sampling Service on-site-1 hour minimum
- Pure Liquid Sampler for Contamination-Free Sampling

## Chemical Groupings

### Group 1 Chemicals

1-Methyl-2-Pyrrolidone (NMP) <sup>4</sup>	Hydrofluoric Acid (HF) <sup>4</sup>	Nitric Acid (70% HNO <sub>3</sub> ) <sup>4</sup>
2-Propanol (IPA)	Hydrogen Peroxide (H <sub>2</sub> O <sub>2</sub> )	PGMEA <sup>4</sup>
Acetic Acid	Methanol (MeOH)	SC1 Cleaning Solution (NH <sub>4</sub> OH:H <sub>2</sub> O <sub>2</sub> :H <sub>2</sub> O)
Acetone	Methyl Ethyl Ketone (MEK)	SC2 Cleaning Solution (HCl:H <sub>2</sub> O <sub>2</sub> :H <sub>2</sub> O)
Ammonium Hydroxide(NH <sub>4</sub> OH)	Methyl Isobutyl Ketone (MIBK) <sup>4</sup>	Organic Solvents *
Cyclohexanone <sup>4</sup>	Mixed Acid Etchants (MAE): (HF:HNO <sub>3</sub> ), (HF:HNO <sub>3</sub> :HOAc), (HF:H <sub>2</sub> O <sub>2</sub> )	Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> ) <sup>1,4</sup>
Hexamethyldisilazane (HMDS)	Piranha(H <sub>2</sub> O <sub>2</sub> :H <sub>2</sub> SO <sub>4</sub> )	Tetramethylammonium Hydroxide (TMAH) < 2.5% <sup>1</sup>
Hydrochloric Acid (HCl)	n-Butyl Acetate (NBA)	

### Group 2 Chemicals

Ammonium Fluoride Solution <sup>1</sup> (NH <sub>4</sub> F)	Non Ionic Surfactants	Resist Strippers
Buffered Oxide Etchants (BOE) <sup>1,4</sup>	Organic Solvents *	Tetramethylammonium Hydroxide (TMAH) > 2.5%

### Group 3 Chemicals

Negative Photoresists <sup>2</sup>	Photoresist Resins	Polyfluorocarbons
Positive Photoresists <sup>2</sup>	Ethylene Glycol	Polypropylene
Polyimide Solutions	Polymeric Materials	Epoxy Resins
Polyimide Resins	Polyethylene	Waxes
Photosensitizers <sup>2</sup>		

### Group 4 Chemicals

CMP (Silica slurries)	Spin-on-Phosphorus (SOP)	Silicon Dioxide Powder
Spin-on-Glass (SOG)	Quartz Materials (beakers, boats)	Flowable Oxide
Spin-on-Boron (SOB)		

### Group 5 Chemicals

Tetraethyl Orthosilicate (TEOS)	Germanium Tetrachloride <sup>3</sup>
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\* Contact your local sales representative for turnaround time or for more details.

1 Turnaround time < 4 days.

2 Due to special additives, additional analytical procedures may be required.

3 Special handling is required for these chemicals. Add special handling charge of \$200.00 per shipment.

4 Available by ICP-MS through Fremont Laboratory and by ICP-OES through Dallas Laboratory.

5 Only 16 and 30 elements are available for group 3-5 chemicals.

For groups 3-5 16 elements include Sr instead of Sn and 30 Elements include: Al, B, Ca, Cr, Cu, Fe, Pb, Li, Mg, Mn, Ni, K, Na, Sr, Ti, Zn, Be, Bi, Cd, Cs, Co, Ga, In, Mo, Rb, Ag, Th, Sn, V, and Zr