Zero Defects

Entegris Newsletter

March 2018

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Entegris Acquires Particle Sizing Systems, LLC To Expand The Value Of Its Product Portfolio For Advanced-Node Manufacturers

Entegris announced on January 22nd that it acquired Particle Sizing Systems, LLC (PSS), a company focused on particle sizing instrumentation for liquid applications in both semiconductor and life science industries.

This acquisition reflects Entegris' value creation strategy by leveraging its global technology platform and customer relationships. The total purchase price of the acquisition was approximately $37 million in cash, subject to customary working capital adjustments. Entegris expects this transaction to be accretive to 2018 earnings.

Digital transformation continues to create a high demand for sophisticated cloud computing infrastructures that require the most advanced logic and memory chips available. However, advanced-node manufacturers already challenged by a continuously shrinking process window and high fab costs struggle to maintain yield and eliminate losses associated with CMP performance.

In advanced-node CMP applications, scratch defects are often caused by the agglomeration of slurry abrasive particles that have the potential to become a key factor in process yield performance. With the technology from PSS, **Entegris is enabling customers to perform particle size analysis online and in real time, directly in the fluid stream process**. Automating the monitoring process can lead to the application of more effective solutions like proper filter selection and system maintenance. This ability to intervene with these solutions prevents costly yield excursions.

"To stay competitive, our advanced-node customers need tools that allow them to shorten process times while maintaining accuracy and consistency in order to meet the high-quality standards of the manufacturers they partner with," says Todd Edlund, Chief Operating Officer, Entegris. "PSS technology is unique in that it measures every particle in the slurry, making it more accurate than commonly used methods that employ averaging techniques. As a result, this technology eliminates the need for manual sampling and intervention, which is less efficient and runs a higher risk of slurry excursions."

For more information, please see https://www.entegris.com/content/en/home/about-us/news/entegris-acquires-particle-sizing-systems-llc.html

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JOPPA'S 27 Fluorine-free Tungsten Films Applied as Low Resistance Liner For Phase Change Memory PCRAM

By Philippe Rodriguez Research Engineer, CEA/LETI & Paola Gonzalez-Aguirre Ph.D., Engineer II, CEA/LETI assignee Entegris Inc.

Currently, interconnect technology is widely dominated by copper metallization. **Nevertheless, as feature sizes decrease for advanced technologies, efficient copper metallization and interconnect reliability are becoming real challenges for future manufacturing.** Since for line width below 30 nm a dramatic increase of the wire resistance is observed, many metallization schemes are currently under development. In parallel to Cu metallization, tungsten plug processes have been widely used in the most advanced semiconductor devices. Due to his low resistivity and conformal bulk fill in high aspect ratio and narrow features, **W metallization is a serious alternative to the Cu one**. In tungsten plug process, the traditional metallization has used the sequential following scheme: TiN / SiH_4 or B_2H_6 nucleation layers / WF6 CVD W, where the TiN (3–5 nm) acts as both an adhesion layer on dielectrics and a barrier to F dissemination during the CVD W process. **The major challenge for W fill scaling is thus to improve the lines by increasing the volume of the low resistance CVD W bulk material.** So far, TiN has been the best known material to provide an adhesion layer for CVD W and to restrain fluorine diffusion but a nucleation layer is then required before CVD W.

Using Joppa27™ precursor, a fluorine-free tungsten thin film has been obtained using plasma-enhanced CVD step and ALD cycles. The W liner with thicknesses ranging from 3 to 4 nm has been implemented on PCRAM structures in order to evaluate its impact on contact plug resistivity. First electrical results are promising and demonstrate the interest of using Joppa27 as F-free low resistance W liner. **At the aspect ratio studied, the gain in terms of contact plug resistivity is about 20% compared to the process of reference using a TiN liner.**

EXPERIMENTAL

A Volta™ CVD W chamber has been installed on a 300 mm Applied Materials Endura® platform. Deposition temperature is set at 180 °C. The sequence used for this study consists in a first step of precursor soak, then a plasma-enhanced CVD (PECVD) step is performed and finally atomic layer deposition (ALD) cycles are realized. The soak and PECVD steps lead to a film thickness of about 1 nm (XRR measurement); the desired thickness is then modulated by the number of ALD cycles. Argon is used as carrier gas and Joppa27 is used as tungsten precursor.

PCRAM APPLICATIONS

In embedded PCRAM technology, as the PCM module is integrated between the front-end and the back-end of the CMOS process, the compatibility of the memory integration with the advanced CMOS process must be carefully evaluated. The F-free W liner has been implemented on PCRAM architecture in order to evaluate its impact on contact plug resistivity. A schematic representation of these stacked contact plugs are shown on Fig. 1(a) and a TEM image of a complete stacked contact plug is given on Fig. 1(b). The contact level 1 is 140 nm high and 55 nm wide whereas the contact level 2 is 250 nm high and 40 nm wide. For the process of reference (POR), whatever the contact level, the metallization process is the following: an 8 nm thick Ti layer is deposited in the contact plug's bottom, then a 3 nm thick TiN liner covers the sides of the plug and a nucleation layer is realized before the W filling. For the samples using the F-free W liner, the latter has only been implemented in substitution of the TiN liner on contact level 2, nucleation layer has been kept but the Ti layer was removed.

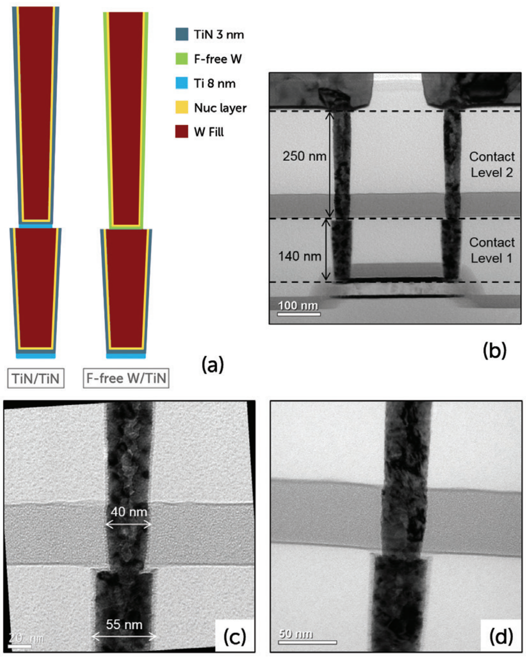
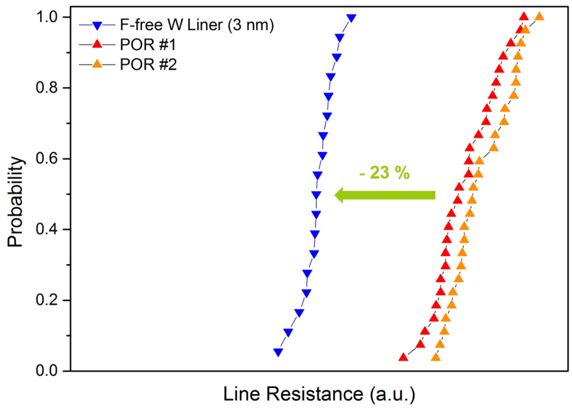


Figure 1. (a) Schematic representation of the stacked contact plugs for the process of reference (left) and the process implementing the F-free W liner (right), (b) TEM image of a complete stacked contact plug, (c) TEM image for a stacked contact plug with the process of reference, (d) TEM image for a stacked contact plug with the F-free W liner on level 2.

Using a 2-wire resistance test, electrical results have been obtained for the POR and the process implementing the W liner. The Fig. 2 displays the cumulative distribution functions (CDF) obtained for the contact plug line resistance of PCRAM structures using the POR or the F-free W liner process. The comparison of the line resistance obtained for 2 different structures using the POR highlights that between two comparable processes the difference in terms of line resistance is about 2–2.5%.



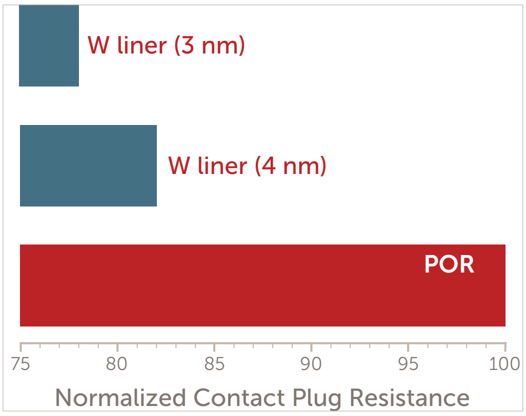


Figure 2. Cumulative distribution functions obtained for contact plug line resistance of PCRAM structures using the process of reference or the F-free W liner process and the Influence of W liner thickness on line resistance gain.

Nevertheless, the slight difference obtained for the structures using the POR especially underlines the fact that the variation obtained in terms of line resistance when using the F-free W liner is unquestionably significant. Indeed, at constant liner thickness (e.g. 3 nm), line resistance benefit from switching from TiN-based to Wbased metallization is up to 23%. Moreover, using W liner, the line resistance distribution appears to be narrower. As a matter of fact, the ratio between the standard deviation value for POR and the one for Wliner process is up to 1.7. Therefore, using W liner not only leads to a significant decrease of the line resistance but also allows reducing disparities from a contact plug to another.

For a normalized contact plug resistance of 100 for the POR, the line resistance is 78 and 82 when using W liner with thicknesses of 3 and 4 nm, respectively. As expected, the line resistance decrease with the W liner thickness. This is related to an increase of the low resistance CVD W fill volume. However, what is remarkable is that even with a W liner thickness (4 nm) greater than the TiN one in the POR (3 nm), the line resistance reduction is still meaningful.

CONCLUSION

Fluorine-free tungsten film has been successfully implemented on PCRAM structures. By substituting the conventional TiN liner by this W liner, the line resistance of PCRAM contact plugs has been decreased about 20%. The F-free W film is not pure. In addition to a surface oxidation, an interface layer is present between the W film and the substrate. This interface layer is probably made of W(CO)x and might be related (i) to the deposition of precursor during the soak step or (ii) to the incomplete decomposition of the precursor during the PECVD step.

Nevertheless, these first results are encouraging and confirm the strong interest of using F-free W liner for this kind of contact structure. Contrary to expectations, the F-free W liner is not only valuable in very small feature but also in larger plugs mainly due to its interface resistance improvement. Thus, beyond PCRAM, others applications in logic, power or photonics may benefit from such films.

This work is a result of a collaboration between Cea-Leti and STMicroelectronics. Complete results are available in: Rodriguez Ph, et.al. Advanced characterizations of fluorine-free tungsten film and its application as low resistance liner for PCRAM. Materials Science in Semiconductor Processing 71 (2017) 433–440

Effect of Flow Rate and Concentration on Filtration Efficiency of Colloidal Abrasives

By Mia Wu, James Lee, Henry Wang, Steven Hsiao, Bob Shie, HJ Yang - Entegris Inc.

Sub 14 nm technology nodes require increased chemical mechanical planarization (CMP) steps compared to previous generation semiconductor devices. For both bulk slurry manufacturers and integrated device manufacturers (IDM), it's critical to reduce large particle counts (LPC), which are undesirable during the CMP process and can create micro-scratches that lead to wafer defects. Slurry filters strive to remove LPC that are generated during the mixing process and formed as gels or agglomerates while maintaining the overall particle size distribution of working particles. Efficient filtration of large particles reduces the number of micro-scratches during final wafer polishing and enables higher wafer yields.

To achieve a very low LPC level, filters are used in multiple locations. These locations are categorized as bulk, point-of-tool (POT), and point of-dispense (POD). The right choice of filtration product at each point of the liquid slurry delivery system, which have different slurry concentrations and flow rate requirements, will affect the outcome. Many studies in slurry filtration have shown the importance of media structure and material characteristics to improve filtration efficiency. **However, none addresses the importance of flow rate and concentration conditions together. This study focuses on understanding the effect of these critical factors on filtration efficiency by evaluating two nano-meltblown (NMB) Entegris CMP filters (NMB01 100 nm and NMBA5 50 nm) with colloidal ceria (CeO_2) and silica (SiO_2) abrasives. The importance of optimization of abrasive concentration, flow rate, and filtration media is demonstrated.**

INTRODUCTION

Silica- and ceria-based slurries are widely used in CMP processes. Advanced filtration is necessary in most CMP processes to reduce unwanted large particles to decrease microscratch-related wafer defects. Depending on the filtration point, either at the chemical manufacturer (bulk filtration), I DM facilities, or at point of use (POT or POD), both concentration of slurry and flow rate will be different (see Figure 1).

The high concentration/high flow-rate-condition is typically used by the bulk chemical manufacturers as well by IDMs in their facilities systems. Post dilution to the desired concentration, the slurry is typically recirculated through a filter at a low concentration and high flow rate. At the point of dispense filtration location, the slurry is dispensed on wafer at the low concentration/ low flow rate condition, though in rare cases a high flow rate may be chosen by the end user.

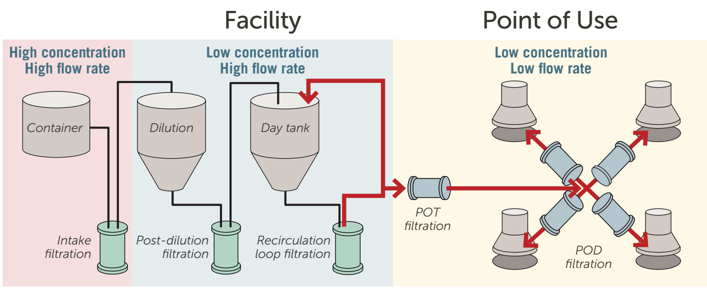


Figure 1. Concentration and flow rate conditions in the slurry delivery system.

EXPERIMENTAL

Experimental Conditions

In this study, we measured large particle count pre- and post-filtration with various abrasive concentrations and two different flow rates. Colloidal silica and ceria slurries were tested with two Entegris nanofiber CMP filters (NMB01 100 nm and NMBA5 50 nm). Particle counts were measured using an AccuSizer® Fx Nano. As shown in Figure 2, we focused on the experimental understanding of the filters performance in the three most commonly encountered CMP slurry filtration system conditions.

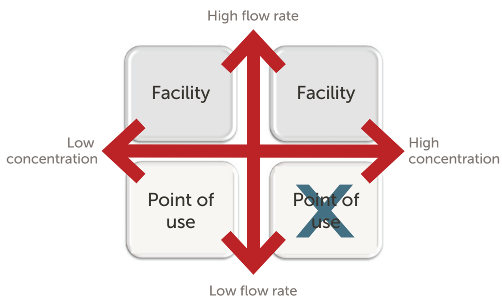


Figure 2. CMP slurry filtration conditions evaluated.

Slurries and Filtration Media

In this Utilizing Entegris' advanced membrane technology, the study finds that NMB-based filters provide very fine fibers from 50 nm to 1 μm and offer lower shear force than traditional microfiber devices to minimize abrasive agglomeration.[1] Two retention rated NMB media were selected: 100 nm and 50 nm.

Most commercial slurries contain abrasive particles (silica, ceria) and additive chemicals for optimal removal rate and selectivity. In this study, two concentrations of pure abrasive silica (20% and 4%) and ceria (1% and 0.1%) with no additive chemical, were used as the challenge particles (see Table 1). Two flow

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rates were selected: 250 mL/min to simulate the low flow rate condition and 5 L/min for the high flow rate condition. Large particle count (LPC) or particles greater than 0.5 µm and 0.8 µm were recorded after up to 50 bath turnovers (T5O).

Filter	Abrasive Type	Mean Particle Size	Concentration	Flow rate	
				High	Low
NMBA5 and NMB01	Colloidal silica	55 nm	20%	5 L/min	–
			4%	5 L/min	250 mL/min
	Colloidal ceria	150 nm	1%	5 L/min	–
			0.1%	5 L/min	250 mL/min

Experimental Setup

A CMP test stand shown in Figure 3 and described in Lu et al.[2] was used for this study.

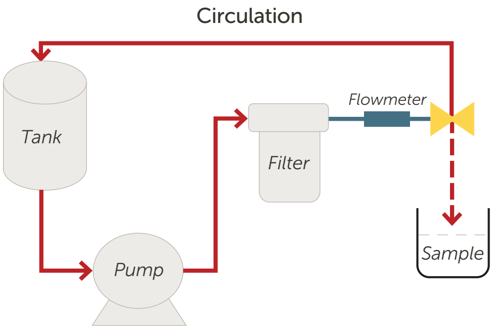

Figure 3. CMP filtration test stand configuration.

RESULTS AND DISCUSSION

Colloidal Silica Abrasive Results

Figure 4 describes the retention results of the two filters (NMB01 and NMBA5) under three different conditions:

a. High concentration, high flow rate
b. Low concentration, high flow rate
c. Low concentration, low flow rate

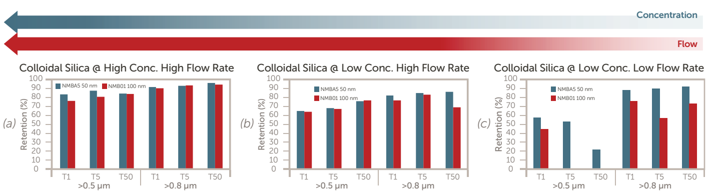

Figure 4. Retention results of colloidal silica abrasive in different test conditions: (a) high concentration/high flow rate; (b) low concentration/high flow rate; (c) low concentration/low flow rate.

- High concentration with high flow rate: For both NMB01 and NMBA5, the retention results of particles greater than 0.5 and 0.8 µm are similar and high at T1 and T5O (Figure 4a). The high retention can be explained by the relatively large zeta potential gap between the filter material (polypropyl-ene) and the colloidal silica abrasive, described in Figure 5, which promotes attraction of the particles to the media and results in high retention performance.
- Low concentration with high flow rate: The retention results are slightly lower (Figure 4b) compared to the high concentration/high flow conditions. From Figure 5, the zeta potential of the colloidal silica approaches the isoelectric point at lower pH (i.e. low silica concentration).
- We suspect the large colloidal silica particles to be unstable at their isoelectric point and potentially agglomerate. Future testing is planned to verify: 1) no change in size distribution of the working particles and 2) potential agglomeration of large particles.
- Zeta Potential

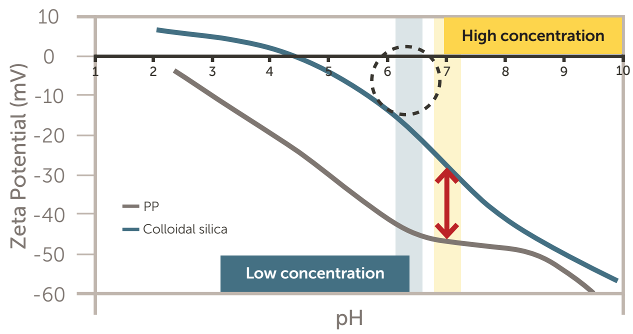

Figure 5. Zeta potential curves of colloidal silica and polypropylene (PP) across the pH range. At high concentration of slurry particles, the pH is alkaline as opposed to lower concentrations where it is more acidic/neutral.

- Low concentration with low flow rate: The retention of colloidal silica under those conditions (Figure 4c) can be explained by analyzing the agglomeration behavior of smaller (>0.5 µm) and larger size (>0.8 µm) particles. Ideally, one would expect that a lower flow rate would increase the chance of capture in the filter media compared to the high flow rate because of the lower flux/higher residence of the colloidal silica at all particle sizes. Though the larger size particles follow the expected trend, our results consist-ently show erratic retention behavior at the lower bin size (>0.5 µm) after multiple turnovers (T5 and T5O). Our current hypotheses for the observed low retention measurements are as follows:
  a. Higher agglomeration rates due to low bath turnover rates with the retention dropping at higher turnover counts
  b. Agglomeration after the collection of post-filtration samples in addition to (a) which shifts the measured particle size distribution to larger particle sizes

We are currently in the process of conducting additional experiments to verify the hypotheses.

Regardless, for particles larger than 0.8 µm, we see that NMB filters provide stable, high retention values which would ultimately minimize micro-scratching during "on-wafer" CMP processes.

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Colloidal Ceria Abrasive Results

Retention performances of NMB01 and NMBA5 were evaluated for colloidal ceria abrasive under three conditions (See Figure 6):

a. High concentration, high flow rate
b. Low concentration, high flow rate
c. Low concentration, low flow rate

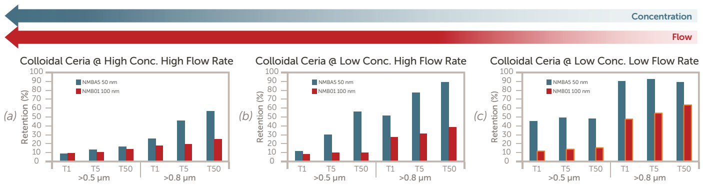

Figure 6. Retention results of colloidal ceria abrasive in different test condition: (a) high concentration, high flow rate; (b) low concentration, high flow rate; (c) low concentration, low flow rate.

- High concentration with high flow rate: The lower retention performance for colloidal ceria abrasive (Figure 6a) can be attributed to low electrostatic interactions between particles and the polypropylene media. This is illustrated in Figure 7, comparing the zeta potential between ceria abrasive and PP fibers.
- Low concentration with high flow rate: The retention behavior is improved compared to the high concentration and high flow rate conditions. We attribute these results to a higher zeta potential gap at low concentration of ceria particles which enhances the non-sieving effect (Figure 7). At higher turnover counts, the retention of particles, especially larger than 0.8 µm, gradually increases via cake filtration with the effect more pronounced in the tighter pore size NMBA5 filter.[2]
- Zeta Potential

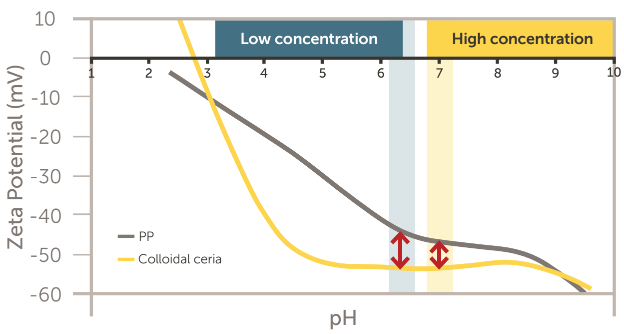

Figure 7. Zeta potential curve of colloidal ceria at different pH.

- Low concentration with low flow rate: Under those conditions, the retention performance of both NMB01 and NMBA5 is constant with the turnover count in contrast to the low concentration high flow rate case where the retention increases with increasing turnover count. At lower flow rates, the lower flux/higher residence time through the filtration media increases the possibility of particle capture. As expected, from Figure 6c, it's clear that a lower flow rate at the same ceria concentration allows both the filtration media to reach the same retention efficiency as observed in the high flow rate case (Figure 6b) at much lower turnover counts (T5 as compared to T5O). Overall, the improved retention seen with the tighter pore size NMBA5 50 nm filter illustrates the importance of sieving retention in next generation filtration solutions.

CONCLUSIONS

The filtration efficiency testing was performed on pure abrasive slurries (silica and ceria) to eliminate possible interaction with slurry chemical additives. Two products were evaluated: Entegris NMB01 and NMBA5 CMP filters.

It was found that depending on the nature of the slurry, the flow rate and the concentration, which are representative of the filtration point in the slurry delivery system, the filtration performance can be different. **The importance of both a tighter filtration media (sieving) and the zeta potential gap between the particle and filter media (PP) was demonstrated in the cases considered.** In the case of silica abrasive, the zeta potential gap plays an important role in enhancing retention, especially at higher concentration. At lower concentration, agglomeration of colloidal silica is a challenge we are currently trying to characterize and explain — the agglomeration effect is severe at low flow rates. In contrast, the ceria abrasive follows the expected trends at all combinations of concentration and flow rate. Overall, the multiple case studies in this paper aimed at replicating the conditions observed during slurry filtration and underscoring the importance of optimization of abrasive concentrations and flow rates. In the future, three way collaborations between bulk chemical manufacturers, IDMs and Entegris can help create optimal solutions geared to overcome specific challenges in CMP slurry filtration.

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Cu Seed Etch for Bumping

By S. Suhard, C. Lorant, A. Miller, F. Holsteyns - imec, Leuven, Belgium and R. R. Lieten - Entegris

3D stacking of integrated circuits (3D-SIC) is gaining importance thanks to the many advantages: reduced footprint, increased performance due to fast inter chip communication, reduced power consumption, heterogenous integration of optimized ICs, and reduced cost through better yield.

The fabrication of micro bumps (or pillars) is an important aspect of 3D-SIC.[1] 2 chips can be electrically connected by forming an array of micro bumps on each chip, aligning both arrays and stacking them on top of each other. Micro bumps are most commonly made of Cu metal, with a Ni barrier layer and Sn solder layer on top, to allow for an alloy formation between bumps, with good mechanical and electrical properties. Besides Cu, Ni and Sn in the bumps, often Al probing pads are present within the die. It is important that the micro bumps are mechanically stable and wide enough to allow alignment of the bump arrays of 2 chips. A straightforward approach to make an array of metal bumps is depicted in Figure 1.[2]

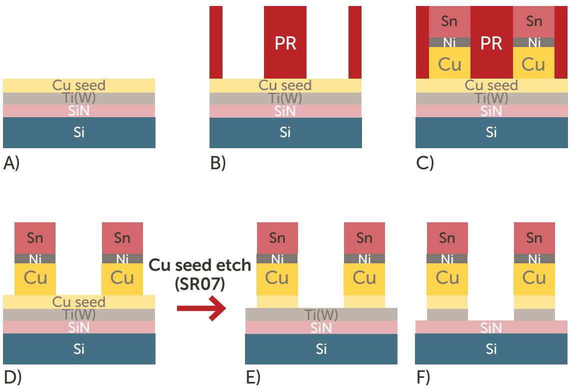

Figure 1. Cu bumping process:[2]

A) A Cu seed layer is deposited by physical vapor deposition (PVD) on a Ti(W) adhesion layer.

B) A photoresist is deposited and patterned.

C) Cu bumps are electrochemically plated (ECP) and Ni and Sn under bump metal (UBM) are plated on top.

D) The photoresist is stripped.

E) The Cu seed layer is chemically etched in between the bumps.

F) Finally, the Ti(W) adhesion layer is chemically etched in between the bumps.

During the Cu seed etch step (E in Figure 1), the physical vapor deposited (PVD) Cu seed layer is removed. The challenges for this Cu seed etch step are: material (Cu, Sn, Ni, Al) compatibility, limited bump undercut, limited critical dimension loss (lateral etch), and a smooth bump surface (summary shown in Figure 2).

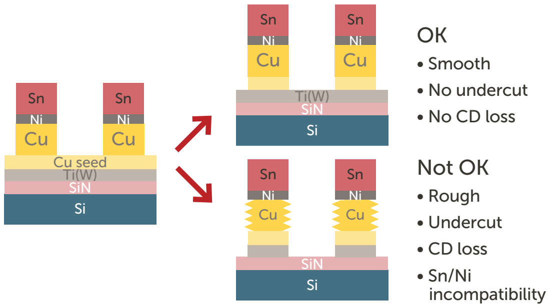

Figure 2. Challenges of Cu seed etch step for bumping.

Increasing the connection density between ICs requires a reduction in bump size and pitch. At reduced bump dimensions, the tolerance of the lateral bump etch is even further reduced when considering the impact of the seed removal step.

The presence of a variety of metals (Cu,Ni,Sn,Al), and the reduction in bump size, drives the request for more selective Cu seed etch chemistries. Entegris® has developed a Cu seed etch chemistry, SR07®, that meets the specifications for material compatibility, and allows for fast, uniform and repeatable processing.

IMEC EVALUATION OF THE ENTEGRIS CU SEED ETCH CHEMISTRY SR07

The research institute imec® has evaluated the Entegris Cu seed etch solution (SR07) for 10 µm to 100 µm bump pitches. Their Cu seed etch requirements were targeting a complete clearance of the PVD Cu seed (150 nm) within 2 min to allow single wafer processing, limited lateral (ECP) Cu etch: ~300 nm loss, limited undercut, compatibility with Ni, Sn (underbump metals).

All the experiments were conducted on a SCREEN 300 mm single wafer cleaning platform (SU-3200). The Cu seed etch chemistry (SR07) is mixed in line with hydrogen peroxide (SR07:H_2O:30%-H_2O_2 at 27:72:1). For the subsequent TiW etch, diluted hydrogen peroxide (30%-H_2O_2: deionized water at 1:10) was used. Experiments were conducted on blanket 300 mm wafers (150 nm Cu seed/30 nm TiW/500 nm SiO_2), and patterned wafers. These patterned wafers have bump pitches ranging from 10 µm to 100 µm, and bump heights from 7 µm to 50 µm. The process time was set to 70s for the Cu seed etch, and the process temperature was set to room temperature.

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Cu etch rate results

The Cu etch rate is controlled by adjusting the H_2O_2 concentration, typically to have a process time between 30s and 120s. The Cu seed etch rate changes from 40 nm/min at 0.3% of 30%-H_2O_2 to 800 nm/min at 6% 30%-H_2O_2, as shown in Figure 3.

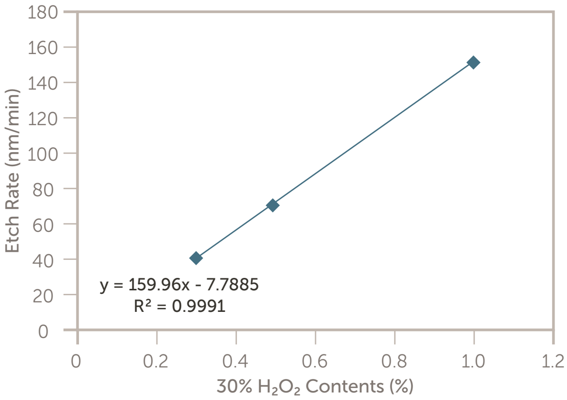

Figure 3. Cu etch rate of SR07 as function of H_2O_2 concentration.

SR07 can be used in batch and single wafer tools. During wafer processing, H_2O_2 in the bath is consumed. In situ H_2O_2 (or pH) monitoring and spiking is recommended to increase the bath life and decrease the cost of ownership. Figure 4 shows the Cu etch rate as function of time for 30 Cu seed wafers/day processing.

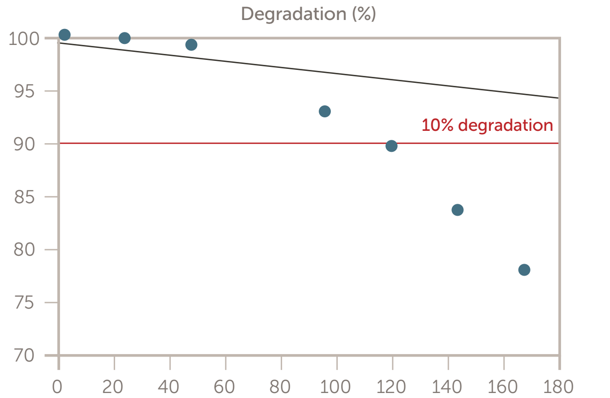

Figure 4. Percent reduction in etch rate as function of time and 30 Cu seed wafers/day.

Without spiking, the Cu seed etch rate is reduced by 10% after 5 days.

Cu bumping results

For Cu bumping, imec developed an integrated wet process sequence (consisting of a resist strip, a Cu seed etch and a TiW etch) that is compatible with aluminum. End-point detection is used for the Cu seed etch process to have a better control on the lateral etch, especially when dealing with a 10 µm pitch. The chemistry allows for clear end-point detection on SCREEN SU-3200 thanks to the high and uniform etch rate.

In Figure 5, 10 µm pitch Cu bumps after Cu seed etch with SR07 are shown.

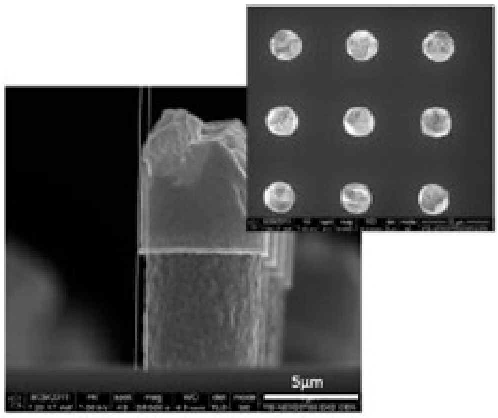

Figure 5. 10 µm pitch Cu bumps after Cu seed etch with SR07 and endpoint control.[2]

No Cu residues are observed, also not for bumps with pitches of 20 or 100 µm. The process uniformity was excellent, with $3\sigma < 2\%$ (Cu loss). Bumps with a 10 µm pitch are the most challenging structure in terms of lateral etch and process robustness.[3] The Cu Seed etch process assisted with an end-point detection on 10 µm pitch bumps are yielding bumps with a limited lateral etch of 180-200 nm while removing 150 nm of PVD Cu seed. The same Cu seed etch process on 10 µm pitch bumps without end-point detection is yielding bumps with a lateral etch of 300 nm to 350 nm.

CONCLUSIONS

SR07 is a high-performance Cu seed etch formulation with high and tunable Cu etch rate, limited Cu ECP loss, compatible with Ni, Sn, Ti(W) and Al, limited roughening, capable of use with end point detection and capable of chemistry recycling (several days bath lifetime).

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Purasol™ SN/SP Solvent Purifiers: Total Metal Removal for Ultraclean Chemical Manufacturers

Entegris demonstrated in a paper published in a previous Zero Defects edition, that solvent polarity plays a key role in metal removal performance. **Entegris has developed two uniquely tailored purification technologies for total metal reduction in wide range of solvent polarities.** Purasol™ SP was shown to effectively reduce metal contamination in highly polar solvents such as 70:30 mixtures of PGME and PGMEA, while Purasol SN could be effective in less polar solvents such as PGMEA and CHN.

In addition, Purasol SN is more effective in removing metal contamination in PGMEA-based polymer solutions. Although PGMEA and CHN have been employed recently to dissolve resist polymers, they are inadequate and/or not fully compatible with current purification needs. **Therefore Purasol purifiers provide a much needed solution to the technical challenges of metal contamination.**

FEATURES & BENEFITS

Broad chemical compatibility	Most organic photochemical solvents (including ketones such as cyclohexanone)
	Raw materials (such as polymer solutions) used in photochemical manufacturing
UPE purification media	Superior cleanliness compared to other purifier technologies
Two distinct purification media types	Ensuring total metal removal in both polar and nonpolar solvents

Purasol SN/SP solvent purifiers deliver best-in-class solutions for ultraclean chemical manufacturers. Using a uniquely tailored membrane technology, the versatile purifier can efficiently remove both dissolved and colloidal metal contaminants from a wide variety of polar and non-polar solvents, including ketones such as cyclohexanone.

Feedback

We value your feedback and suggestions to help us improve Zero Defects.
Please send your questions, suggestions and comments to Asia_News@entegris.com

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