Versum Materials announces an the GASGUARD® Delivery System for Acetylene for amorphous carbon hard mask (CHM) applications. For semiconductor device manufacturers in the DRAM and Flash Memory markets, the system meets both the process requirements of the semiconductor industry and addresses the unique safety issues that acetylene presents.

Amorphous carbon film, used for high aspect ratio etching, enables decoupling of the etch from the photoresist and extends existing 193nm dry lithography tools for advanced technology nodes as critical dimensions continue to shrink.

**CUSTOMER BENEFITS**
- Increased cylinder utilization to ~90%
- Operating cost reduction
- Improved film quality
- Improved yields

**ADVANTAGES OF ACETYLENE PROCESS VS. PROPYLENE**
- Lower deposition temperature
- Better deposition yield
- Better etch selectivity
- Film more transparent, good for mask alignment (thicker film gives better etch selectivity)

**CHALLENGES OF ACETYLENE PROCESS**
- Acetylene is much more difficult to handle than propylene
- Unique acetylene packaging due to safety requirements
- Industrial suppliers of acetylene do not understand the electronics market and need for material consistency

**IN A CURRENT ACETYLENE DELIVERY SYSTEM**
Due to the instability of acetylene, a porous mass and a solvent (typically acetone) are within the cylinder package. As gas is drawn from the cylinder, acetone is carried in the acetylene stream. The acetone concentration increases as the volume of acetylene decreases in the cylinder. Eventually, acetone concentration reaches a point that affects the process.

**THE SOLUTION:**
Versum Materials Acetylene Delivery System (patent pending)
### ACETYLENE DELIVERY SYSTEM COMPONENTS

<table>
<thead>
<tr>
<th>Component</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gas cabinet</td>
<td></td>
</tr>
<tr>
<td>Chiller</td>
<td></td>
</tr>
<tr>
<td>Purifier</td>
<td></td>
</tr>
</tbody>
</table>

#### RESULTS AT –20°C WITH PURIFIER—
**TEST 31—ACETONE VS. WEIGHT**

- Acetone concentration is reduced as cylinder temperature is reduced
- Acetone concentrations can be maintained below 2% by chilling alone
- Acetone concentrations can be maintained below 10 ppm with a purifier
- Consistently low Acetone concentrations across entire cylinder volume

For more information, please contact us at:

**VERSUM MATERIALS, INC.**

**VERSUMMATERIALS.COM**

The information contained herein is offered without charge for use by technically qualified personnel at their discretion and risk. All statements, technical information and recommendations contained herein are based on tests and data which we believe to be reliable, but the accuracy or completeness thereof is not guaranteed and no warranty of any kind is made with respect thereto.