

Air Products' high-k Materials Enable Semiconductor Advances

March 21, 2007 10:24 AM ET

high-k Materials Allow Smaller, Faster Chips to Work More Efficiently

LEHIGH VALLEY, Pa., March 21, 2007 /PRNewswire-FirstCall via COMTEX News Network/ -- Recent advances by major semiconductor manufacturers to develop 45 nanometer (nm) semiconductor chips have been made possible through the use of high-k materials in the gate dielectric. Air Products (NYSE: APD) produces and markets a variety of high-k precursors which are used to deposit defect-free gate dielectrics through chemical vapor deposition or atomic layer deposition. The use of high-k dielectrics in conjunction with metal gates improves semiconductor performance and meets consumer demand for smaller, faster devices with longer battery lifetimes. Use of these chips will allow electronic devices to operate at even quicker speeds, while using considerably less power.

Previously, the semiconductor industry had used silicon dioxide to build transistor gate dielectrics. However, as the industry continues the drive to smaller chip geometries, gate dielectric thickness has decreased dramatically. This has led to an increase in gate oxide leakage, a major technical hurdle facing the semiconductor industry. high-k materials combat the leakage issue, while at the same time preserve the capacitance necessary for transistor performance.

"Air Products' high-k material portfolio is another example of our responding to customer needs," said Corning Painter, vice president, Electronics, for Air Products. "We have worked for almost a decade in collaboration with our leading customers and major equipment manufacturers to ensure that our materials and delivery solutions are production-ready."

Air Products' high-k offerings include precursors for hafnium, zirconium, aluminum and lanthanum. The various material choices present unique delivery challenges. In response to this, Air Products has developed proven high volume delivery systems that meet the consistency and reliability needs of our customers.

Air Products is the only high-k material supplier able to offer a full portfolio of products and services to complement our high-k materials, including:

- proven refill delivery equipment specially designed to handle many of these often sensitive materials;
- high-k material etching and chamber clean expertise, and
- front end of line (FEOL) formulated cleans which prepare the wafer surface for subsequent processing steps by selectively removing post-etch polymer residue without damaging the transistor region.

While high-k materials will make their debut in logic chips at the 45 nm node, they are already seeing use in memory chips as stacked capacitors and trench capacitors.

Air Products (NYSE: APD) serves customers in industrial, energy, technology and healthcare markets worldwide with a unique portfolio of atmospheric gases, process and specialty gases, performance materials, and equipment and services. Founded in 1940, Air Products has built leading positions in key growth markets such as semiconductor materials, refinery hydrogen, home healthcare services, natural gas liquefaction, and advanced coatings and adhesives. The company is recognized for its innovative culture, operational excellence and commitment to safety and the environment and is listed in the Dow Jones Sustainability and FTSE4Good Indices. The company has annual revenues of \$9 billion, operations in over 40 countries, and over 20,000 employees around the globe. For more information, visit www.airproducts.com.

***NOTE: This release may contain forward-looking statements. Actual results could vary materially, due to changes in current expectations.

SOURCE Air Products

Media Inquiries, Robert Brown, +1-610-481-1192, brownerf@airproducts.com, or Investor

Inquiries, Nelson Squires, +1-610-481-7461; squirenj@airproducts.com, both of Air Products

<http://www.airproducts.com/>