electronics e-learning center

Electronics High-k Market

Monica Peeters

Welcome to another Air Products Podcast. I'm Ed McKendry and our topic today is Air Products involvement in High-K Technology. We're speaking with Monica Peeters. Monica has been with Air Products for 8 years in a product management role. Monica, thank you for being with us today.

Thanks Ed.

To get started here, Monica, I'll take a look at the first question we have is, what is going on in the High-K market?

It's a very dynamic time for the development and integration of High-K precursors into semiconductor's processes. In 2003, DRAM manufacturers started using these materials for the production of stock capacitors, but they continue to look for new materials and better delivery methods for future processes. A couple of the largest logic manufacturers have announced their intention to use High-K precursors in production in 2007 and others are certain to follow in the near future.

So talk a little bit about why these materials are being integrated now?

The advantage of High-K dielectrics over the traditional silicon oxide-based dielectrics is that there is less gate leakage and higher drive current. They also allow future scaling to the next generation. Conventional dielectrics are already reaching critical thickness—about 5 atoms and it is really not possible for them to get any thinner.

So what kind of challenges do these High-K precursors have?

Well there's a lot more involved in providing quality new solutions to customers than making sure you are meeting on-time delivery of molecules. For instance, accurate Certificates of Analyses are critical to understanding the true purity of a chemical. Differences in analytical methods mean that different numbers will get reported. Also, many of the new precursors have physical properties that mean they are challenging to deliver. Some have a low vapor pressure. Some are solid. Some are overly sensitive to moisture and others decompose at lower temperatures than is ideal.

Well, it sounds like there are some significant challenges there. What does Air Products bring to this product category?

Air Products has developed containers and delivery equipment that can address each of the challenges already mentioned. Our CHEMGUARD 500 incorporates solvent into the line cleaning to ensure that the chemical is thoroughly removed before they get exposed to air. The Schumacher solid source container effectively delivers solids at reasonable temperatures and ensures maximum utilization of the fill of these intrinsically more expensive molecules.

Our BK2700 new JT container addresses issues that can arise when delivering moisture sensitive chemicals via bubbling. The vapor guard carefully controls temperatures within tight parameters. Air Products also has processing expertise within our company that can be used to help solve individual customer issues.

Talk a little bit about the path forward and the future of these molecules.

The path isn't exactly clear. Manufacturers are individually making decisions about which precursors are right for them. Today, their processes are dominated by aluminum, hafnium, and zirconium-based High-K materials. Air Products will be prepared to adapt and innovate as their future choices become clear.

We just talked about a fair amount of technical information and technical terms—for our listeners, Monica, if you had one key message that you want to leave them with, what would that be?

Well, I guess what I'd like people to know is that Air Products is the only company with as wide a product offering for High-K processes. We've got equipment, containers, precursors, as well as, front end of line formulated cleans.

So the full scope of what's regarded or what's needed for High-K materials. Thanks Monica for that information. If our listeners have more questions and want more information, how about if they e-mail you? Is that OK?

Sure. They could reach me at peeterm1@airproducts.com.