



DuPont

**Line of Business Teach-in: Semiconductor Technologies
Conference Call**

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C O R P O R A T E P A R T I C I P A N T S

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Vincent Andrews, *Morgan Stanley*

Josh Spector, *UBS*

P R E S E N T A T I O N

Operator

Good day and welcome to the DuPont webcast.

Please be advised that today's conference is being recorded.

At this time, I would like to turn the conference over to Pat Fitzgerald, DuPont Investor Relations. Please go ahead.

Patrick Fitzgerald

Hello, and thank you for joining this morning's Line of Business Teach-in with Jon Kemp, President of DuPont Electronics and Industrial. Jon will provide an overview of our semiconductor technologies business, one of the three businesses within the E&I segment.

We have prepared slides to supplement our comments during today's webcast, which are available on the Investor Relations section of our website.

We hope today's teach-in provides additional detail of the underlying technologies and growth opportunities for the semiconductor technologies business, as well as our views on the market.

Jon will open with prepared remarks, and then we will move to Q&A.

We are targeting a total of approximately 45 minutes for today's event.

Before we begin, let me remind you that during today's prepared remarks, as well as the Q&A session, we will make forward-looking statements regarding our expectations or predictions about the future of the business and the semiconductor market. Because these statements are based on current assumptions and factors that involve risks and uncertainties, our actual performance and results may differ materially from our forward-looking statements. Please read the forward-looking statement disclaimer contained in the slides.

I'll now turn the call over to Jon.

Jon Kemp

Thank you Pat.

It's great to have this opportunity to showcase the semiconductor technologies business at this first teach-in event. It's among many market leading businesses we have in the DuPont portfolio which are well aligned with secular growth trends that combine leading-edge innovation, global scale and deep customer relationships. The semiconductor technologies business is a specialty materials supplier with one of the most comprehensive portfolios in the electronics industry, with 2020 sales of \$1.8 billion. It represents approximately 35% of our electronics and industrial segment today.

I'm proud of the work our teams have done around the world over the past couple of years managing a very complex and dynamic environment. Through the global COVID pandemic, coupled with the increasing challenges associated with logistics and raw materials, our business has continued to partner closely with customers to reliably deliver the innovative and high-quality materials they need to meet the ever increasing demand for electronic materials and devices.

Strong market demand combined with these relationships led to 10% top line growth with 1.6 times operating leverage for the semi business during 2020. The global pandemic accelerated the digital revolution as remote and home-based activities boosted overall demand for electronic devices. This acceleration combined with key industry trends, such as the launch of 5G smartphone, more and more connected devices and the explosion of data collection, processing and storage, has resulted in a proliferation of chip demand and unprecedented levels of investment across the industry. Our business is well positioned from a customer, technology and end market point of view to capitalize on all of these trends.

First on Slide 2, let's look at an overview of the semiconductor technologies business.

We have an exciting portfolio that has been a technology leader in the semiconductor industry for more than 50 years, with roots going back to Dow, Rohm and Haas, Rodel, Shifley (phon) and others. Nearly 90% of our portfolio are products that are consumed in the chip manufacturing processes that's semifast with 10% attributed to permanent materials. As a result, our business is driven by wafer starts and therefore more stable than the broader semi market since it is not exposed to variability in cap ex or equipment cycles. Approximately half of the business is related to chemical mechanical planarization, or CMP, including both pads and slurries. The second largest segment is lithography, comprising just over a quarter of the business. The remaining business is split between advanced cleaning materials and advanced packaging. Our unique combination of both chip fabrication and packaging materials leads to a larger addressable market and additional innovation opportunities with customers.

At the bottom left, you can see an exciting mix of high-growth segments including 5G communication, high performance computing, consumer electronics, industrial and automotive. Most of the growth in the electronics business is driven by consumer devices. However, advanced semiconductor chips can also be found in data centers, hospitals, military and aerospace, automobiles and increasingly industrial applications where connectivity and data processing and storage are needed. While overall demand is increasing, device complexity and capability are also increasing to deliver smaller, faster, more connected and more sustainable performance. This complexity also drives the use of higher performing materials.

We have a large global footprint with state-of-the-art research facilities, application labs, manufacturing plants and people that provide us with critical mass in the United States, Taiwan, Korea, China and Japan. This footprint gives us better customer access and more frequent collaboration opportunity. In the center you can see that about 77% of our sales are generated in Asia, with the Americas and Europe accounting for about 15% and 8%, respectively. We have about 2,000 employees strategically located around the world to be close to customers. Our strong global footprint and supply chain flexibility enabled us to gain share during the pandemic when opportunities arose that required quick and innovative responses to meet customer needs.

By cultivating decades long relationships with customers, we have earned their trust and a seat at the design table. They count on us to bring them the most advanced solutions to solve their toughest challenges. Recognizing that criticality of innovation, we continue to invest about 9% of our semi revenue in R&D, which is among the highest amounts and rates in the industry. We work closely with our customers to prioritize the R&D spend to the highest value programs, aligning our product road map closely to the emerging process challenges of the industry, which I'll talk more about in a minute.

Moving to Slide 3, you'll see the strong financial profile of our semi business, as well as key elements of our growth strategy. The semi business has a history of consistent growth that is well correlated with wafer starts, and we're on a trajectory of achieving about 13% compound annual growth from 2019 through 2021, which is ahead of the market growth of approximately 8%. Over time, we expect the strength of our portfolio and innovative solutions to consistently outperform the market by 200 to 300 basis points. Operating EBITDA margins for the business have been consistently strong and well above the Company average.

Our consistent growth is the result of our partner of choice mindset. With early engagement on technology and process road maps, we customize most of our solutions to our customers' unique performance and process requirements. We have demonstrated over decades our ability to effectively scale technology from the labs to high volume manufacturing with the reliability and quality that our customers demand, and once our offerings are specified, they tend to remain in place throughout the product lifecycle.

As chips become more advanced, they also require enabling technology, which increases the demand for high-quality materials. As chip technology transitions to smaller geometries or advanced nodes and more complex architectures, meaning more layers and process steps, we have focused our innovation on delivering higher value solutions, thereby increasing the content we have on each wafer. While we are well positioned to capitalize on secular market trends and technology transitions from an organic growth perspective, we will also continue to pursue bolt-on acquisitions and high-value adjacencies that will broaden and deepen our technology portfolio both in chip fabrication materials as well as packaging and assembly solutions.

Moving to Slide 4, multiple drivers are contributing to the rapid growth in the semi industry, including high-performance computing, 5G connectivity, artificial intelligence, smart and autonomous vehicles and the Internet of Things. The world's appetite continues to grow for small, fast, powerful, efficient and fully connected devices, which in turn drives up the demand for chips.

Chip demand has been remarkably consistent over the years as chips have become ubiquitous in our everyday lives. One measure we like to use as a proxy for chip demand is wafer starts, noted here in millions of square inches, or MSIs. Given the strong demand drivers, we expect MSI to grow in the 4% to 6% range with room for upside potential.

Supporting this growth is the significant increase in semiconductor cap ex spending. For example, this year, top tier semi OEMs in every region of the world have collectively announced hundreds of billions of dollars in new cap ex investment, most of which is directed towards leading-edge capacity. We also monitor investments, such as those that major electronics and technology OEMs are making in data centers, or investments that auto OEMs are making in smart and electric vehicles. All of these investments point to an exciting future for us and the electronics industry as the demand for more and more semiconductors shows no indications of slowing.

On the left-hand side of Slide 5, you can see how the feature sizes of each new generation of chips has decreased, while the wafer and package architecture, along with process and material complexity have all increased. Leading-edge technology result in better performance and lower power in a smaller area. DuPont's materials enable customer technology road maps that use new structures, new architectures and new ways of packaging chips or connecting them to each other and to circuit boards. When we say small, we mean that we are now operating at the atomic level, and to put nanometers in perspective, a strand of human hair is approximately 80,000 to 100,000 nanometers wide. The features we're now working on with our customers are at 5 nanometers and smaller.

When it comes to impurities, our customers also have challenging requirements, expecting levels less than 1 part per trillion. That's equivalent to a single drop of water in an Olympic size swimming pool. It's difficult to consistently make material at that level of purity with defect rates at or close to zero, which creates a high barriers to entry. We are unique because we can help address challenges like these at multiple points along both the chip fabrication and packaging road maps. Fundamentally, our intent is to enable our customers to implement their technology road map. As devices become smaller, faster, more powerful and more connected, the demands for advanced materials, such as those provided by DuPont, goes up.

Slide 6 shows the technology transition that is taking place to more advanced nodes as well as the increasing number of layers and processing steps for leading-edge architectures. In a consumer device, like a smartphone, there are three broad classifications of semiconductor chips - logic chips that do the thinking and process and two different kinds of memory. The first is called DRAM and is temporary, and the second is NANDs, and is permanent memory. Increasing NAND capacity in a device adds more advanced layers, as the chip design shifts from two dimensional to 3D structures.

Our customers are now building in effect memory skyscrapers with over a hundred layers where it used to be only 30. In advanced logic, the design complexity and number of processing steps increases significantly, requiring more enabling technology. The advanced logic manufacturers represent a smaller but critical portion of the industry since those chips are used in latest generation smartphone, data centers and other high value applications. In addition, legacy or more mature logic chips continue to support many other applications. Our business has higher exposure to advanced nodes, and those leading-edge logic and memory chips use two to three times more materials than older generation technologies.

Turning to Slide 7. Let's look at the semiconductor process steps and where DuPont materials are used, designated here by the red circles. As the wafer enters the process circle in the middle of the slide, it rotates through each of the steps from patterning, where we provide photoresist and other specialty

materials, to deposition and planarization, where we provide both pads and slurries to polish the wafer surface.

Because CMP is such a large part of our business, I wanted to spend a few minutes here to provide some additional color.

Emerging device configurations introduced new materials and process challenges that are not easily solved using existing technology. Our CMP business delivers technology-enabling polishing pads, slurries and application expertise that support customer advances in technical performance, process optimization and improved efficiency, resulting in a better cost of ownership.

Our differentiated capabilities include decades of application engineering expertise that allows us to provide highly customized offerings which are manufactured in state-of-the-art proven high volume processes to deliver exceptional material quality and consistency. Pads from DuPont's portfolio are widely considered to be the industry standard, and have received consistent external recognition.

To further enhance customer success, our offerings are supported by highly skilled technical personnel and resources for close customer collaboration. Following planarization, the wafers move to etching and we are currently developing next-generation high-selectivity etchen (phon) for various substrates, followed by cleaning, where our materials include post-CMP cleaners, post-etch residue removers and new emerging cleans, which are also highly formulated and customized. The process repeats itself as more and more layers or steps are added. The more layers or steps, the more times the wafer rotates through the center wheel and the more materials that are used.

Our enabling technology platforms and chemistries are critical in the wafer process cycle at our fab customers. Once the chip is built by proceeding through the center steps, it moves to packaging and assembly. Packaging refers to attaching the integrated circuit to the circuit board, including adding protective layers and electrical connections, or interconnects, to the substrates.

Today's leading-edge electronics are expected to have more functionality packed in a smaller form factor using less power, while improving performance and reliability. Our packaging materials, including metalization chemistry, thermal interface materials, and dielectrics, are critical to enable conventional packaging, as well as the most advanced wafer level packaging. Advanced wafer level packaging architectures, such as heterogeneous integration and 3D stacking technologies, enables chips to be smaller, streamlines the manufacturing process significantly and provides for easier testing of chip function. These new architectures are rapidly changing as a key area to drive performance improvement and are enabled by high-performing material.

The broad number of intersections in the fabrication and packaging process enables us to fully understand our customers' problems and we therefore can more quickly address our customers' needs. In addition to helping optimize customer processes today, we will be a critical enabler for tomorrow's process solutions.

On the top of Slide 8, you can see the comprehensive portfolio we have to serve the semiconductor industry. As I mentioned earlier, the breadth and depth of our portfolio is unique. This reinforces our position as a design partner to help bring materials and application expertise, as well as the integration of multiple material sets to solve complex customer challenges.

Many of our customer partnerships began more than 20 years ago and we've established a strong track record of differentiating our performance and process capabilities to provide customers with existing and new offerings that meet the increasing quality, purity and reliability standards they require. We have local capabilities strategically placed close to customers around the world. Asia is a large growth driver for the

business and we have significant footprint in the region. Our localization efforts have paid off and we continue to see increased growth from those customers. As investment levels throughout the industry increase, we will also continue to invest in the necessary people, application labs, manufacturing capability and capacity to maintain our leadership position.

And finally, we have optimized our global supply chain with manufacturing assets across Asia and North America, enabling us to flex our network and serve customers in all regions. This capability has been tested over the past two years and we continue to be recognized for our efforts to maintain reliable supply to our customers.

In closing, there are a few key take-aways on Slide 9 that I'd like to leave you with.

First, we have a proven track record of outperforming the market. We will continue to deliver better results than the industry average, driven by our leading-edge technologies that enable our customers to meet the increasing demands of the semiconductor manufacturing process.

Second, we will benefit from the accelerated growth in the semiconductor industry tied to key megatrends, such as high performance computing, high frequency connectivity and smart and autonomous vehicles. The increased complexity of the chips and increased number of layers and process steps, also drives more demand for our materials.

Third, the breadth and depth of the product line is unique in the industry and enables us to address our customers' most critical and complex needs. Where possible, we'll continue to extend into high value adjacencies both organically and through targeted acquisition.

Fourth, we expect to expand our relationships with customers as their partner of choice and gain additional wins from our strong innovation pipeline targeted at leading-edge transition.

And finally, we will deliver sustainable innovation and extend our history of delivering both operational and quality excellence through our industry-leading global supply chain and manufacturing capabilities.

The semiconductor industry is poised for an extended period of growth, investment and opportunity, driven by product and technology road maps that require constant innovation, quality and reliability. DuPont is well positioned to deliver on those requirements and I am confident we will continue to do so.

Now let me turn it back over to Pat to open the Q&A.

Patrick Fitzgerald

Thanks Jon.

Let me remind you that our forward-looking statement disclaimer applies to both the prepared remarks as well as the following Q&A. We will allow for one question and one follow-up question.

Operator, please provide the Q&A instructions.

Operator

To ask a question you will need to press star, one on your telephone. To withdraw your question, press the pound key. Please stand by while we compile the Q&A roster.

Your first question comes from the line of John Walsh with Credit Suisse.

John Walsh

Hi. Good morning everyone.

Patrick Fitzgerald

Good morning.

John Walsh

Thanks for doing this. Definitely very informative. Appreciate your time. You talked about several megatrends and clear tailwinds to your business. I think you used the term consistent when describing that 200 to 300 basis points of market outgrowth. Do you still think that's the right zip code as we look forward one, three, five years, or do you actually think that outgrowth could accelerate from here?

Jon Kemp

Yes, John, that's a great question. I think that when you look at our overall portfolio, I think we're very pleased with how we have been performing. I think the positive drivers in the industry point to an exciting future. I think we noted in the comments that 4% to 6% market growth does have, we believe, some upside potential depending on how the timing and confluence of those megatrends come together. Our ability to deliver increased content per wafer I think also has upside potential. We've been consistent in the outperformance in that 200 to 300 basis points versus the market. As we get higher and higher percentage of the market in those leading-edge technologies and more complex process steps, I think there's room for us to go above that, but right now that's kind of where we're at probably for the next few years.

John Walsh

Great. Thank you. And then just as a follow-up to that, looking at Slide 7 and the wafer process cycle, as I understood it a lot of your competitors kind of do one of those circles, maybe well that you compete with and you clearly have a larger breadth here. Is that a fair characterization and do you see that changing over time as maybe competitors want to move into more adjacent parts of the market? Thank you.

Jon Kemp

Yes, I think that's an astute observation, John. You're right. Most of the people in the industry are focused competitors who have an expertise in a given process step and that's certainly the way a lot of the industry has grown up. We continue to see different consolidation opportunities. The industry remains fairly fragmented. That's why we're excited to continue to be one of the (inaudible) active on the M&A front to continue to broaden and deepen our portfolio and some of those opportunities present themselves. I think there will be other competitors who look to do the same thing. If you think about the history, going back, this is one of the real benefits of bringing the Dow and the DuPont portfolios together was it really created this breadth of multiple product lines in the portfolio and made it unique. I think that a lot of the standalone companies in the space tend to be smaller, more fragmented. The ability to do some consolidation can be a little bit limited. I think you'll see more of that and we'll continue to be an active participant in that process as well.

John Walsh

Great. Thank you for taking the questions. Appreciate it.

Patrick Fitzgerald

Thanks John.

Jon Kemp

Thanks John.

Operator

Your next question comes from the line of Steve Tusa with J.P. Morgan.

Steve Tusa

Hi, good morning.

Patrick Fitzgerald

Good morning Steve.

Steve Tusa

Thanks for this. Very helpful. I'm just trying to kind of square the kind of market outgrowth comments because obviously you're doing much better than that or maybe you aren't because the market's doing really well right now. How over the next kind of—there's a lot of cross currents right now with obviously shortages and capacity being built, demand is still pretty strong. How do you see this business growing over the next 12 to 18 months in the context of that market growth rate and your ability to outgrow? Does it all smooth out over that time period or is there some kind of near-term volatility because of what's going on out there?

Jon Kemp

Yes. Steve, good question. I think as we think about the next 18 months or so, first of all, the last two years I think we've seen some acceleration in the industry. As we went through 2019, went through a little bit of a downturn, maybe a correction driven mostly in the memory market and then started to come out of that in the second half of '19. In '20 and '21, we saw just a real acceleration. As I indicated before, the pandemic induced some of that as we had a lot of shifts to remote and data-driven activities for events like this one, where a lot of people are using devices and connecting remotely and that accelerated demand, and then as the industry started to recover in 2021 we've seen that continue to accelerate, and that's obviously been mitigated a little bit by some of the supply chain and logistics dynamics. But overall the industry has continued to be at record utilization rates. Obviously, there's the investment in new fab capacity that will come on as we go forward over the next few years. The bulk of that will hit—it'll be kind of incremental capacity in 2022, 2023 and then it really starts to ramp up after that.

As we look over the next kind of 12 to 18 months, we expect a continuation of the strong growth drivers really driven by those megatrends. The utilization is going to remain high. Fab utilization will remain high. We'll have more transitions to leading-edge technologies and we'll have some new capacity. I do think the last two years have high comps, so the comps are going to continue to be more challenging. So I think you'll see a little bit of moderation in the growth rates to more normal levels from really the accelerated ramps that we've had in the last couple of years but overall it should continue to be a really healthy market.

Steve Tusa

Any kind of—anything in the next six months that you would highlight as being, whether it's comps or shortages or anything that kind of brings that down into kind of—is there a quarter where you don't grow in the next six to nine months because of all these dynamics...

Jon Kemp

I don't think...

Steve Tusa

... and then you reaccelerate?

Jon Kemp

Yes. I don't think—I think it's going to—our order books remain strong. What we're hearing from our customers is really just steady, consistent performance. The fab utilization rates continue to be high. We get more and more transitions to leading-edge to the advanced nodes. All of that would suggest that we're going to continue to have positive growth quarters and our ability to sustain the positive growth should continue. There's always a little bit of quarter-to-quarter fluctuation but sequentially we've been pretty consistent and we would expect that to be able to continue as we go into next year.

Steve Tusa

Great. Thanks a lot. Really appreciate it.

Patrick Fitzgerald

Thanks Steve.

Operator

Your next question comes from the line of Steve Byrne with Bank of America.

Steve Byrne

Yes, thank you. I'm trying to get my head around the chemistry at this low nanometer scale. One of the conflicts I have here is this global chip shortage that we have and your outlook for mid single-digit MSI. Is that not really a very good metric given the scale gets smaller and smaller and thus the surface area of wafer may be growing mid single-digits but the speed of the market is growing much faster than that. Is your technology enabling that speed of moving smaller and more complex chips?

Jon Kemp

Yes. Steve, good question. let me try and clarify. There's a lot there. I agree with you. I struggle to get my head around the scale and the what is a nanometer or an angstrom or some of these are sort of mind blowing technologies for me as well. When you think about the transitions to advanced nodes, you're right in the sense that as the geometries get smaller the surface area on the wafer—you're putting more chips onto a single wafer, and then you're also going three dimensional so a lot of the architecture changes.

The process complexity is the layer augmentation effect. You're going, as we said, in NANDs, for example, from something that traditionally was maybe 30 layers to well over a hundred layers. You're adding and stacking layers to DRAM and logic chips as well. So while the—and that's why you get the consistent outperformance relative to MSI is because our materials enable the ability of our customers to put together those complex architectures at the smaller scale by using higher performing materials and more process steps and as it circles through that wafer cycle a lot of the materials are consumables that are helping customers to optimize their manufacturing process and as they do this they're consuming more of the types of materials that we provide.

So, advancements along both the shrinks in terms of the nodes at the wafers and then the complexity of the packaging, all of that results in higher levels of material intensity that is good for our business.

Steve Byrne

Okay. That's really helpful. In this flow diagram you have on Slide 7 where you basically have these six unit operations and where you're strong in. Would you comment on which of those might be more of a rate limiting step on the throughput from your customers' shop and do your technologies accelerate that speed through where you could gain more market share as they expand capacity?

Jon Kemp

Yes. Steve, it's a good question. I think the uniqueness about—the customers each have their own process combinations, and so the rate limiting step is going to be different customer by customer depending on the type of chip that we're talking about and the size of that chip. So you're going to see that rate limiting step is going to shift from customer to customer and process to process depending on the combination of process technology and ultimately the product that you're selecting. That's why the design partnership and that process partnership is so important for us is that we can work with them to optimize that process across multiple transition points throughout that fab process cycle. So, what may start in the lithography space and you optimize there, then it may shift to one of those other process steps and we can step in and help them optimize for that as well, and it will shift over time depending on that technology road map.

One of the things, I guess, that I would also comment on is traditionally there have been places within the wafer cycle that we're more kind of bulk materials, where you would just kind of buy off where customers would buy off the shelf of bulk chemistries or bulk materials to drop into their process. As the process gets more complicated and the levels of purity and consistency become more important, we're seeing more and more of those spaces migrate from kind of lower end materials, bulk materials into more specialty material. For example, that's what we see in the etching space, for example, where the high selectively etchings where you might use—in some of the older technologies you might use some chemistries that are kind of off the shelf and now they require a high amount of formulation and specialty performance in order to interact with some of the other chemistries in the other steps and that creates a more—a better opportunity for us because you get into kind of formulation expertise and customization of the offering which plays into some of our capabilities.

So that's why we really work with them along each of those process steps to optimize the whole flow and throughput.

Steve Byrne

That's very helpful. Thank you.

Operator

Your next question comes from the line of David Begleiter with Deutsche Bank.

David Begleiter

Hi, how are you?

Jon Kemp

Good David. How are you?

David Begleiter

Great, thanks. Just a question on margins. How do your margins compare to segment average margins? Do you expect your margins to be sustained going forward or actually increase going forward?

Jon Kemp

Thanks David. I think our margins, as we indicated, are well above the Company average. They've been performing consistently over time. We haven't seen any margin erosion and in fact we expect to continue to see some slight margin acceleration as we go forward into higher value solutions and higher value offerings.

David Begleiter

Got it. And just on the share gain. So where actually are you taking share from typically in these applications?

Jon Kemp

It's a fragmented market and so you've got a number of different providers in the industry depending on the process step. I think one of the earlier questions indicated that each of these process steps they're sort of a different set of players that we would compete with. When you think about it broadly from a competitive standpoint, you've got the big ones, would be companies like Entegris CMC Technologies, Merc, a number of Japanese players like JSR, TOK, Fuji Films, and then you've got a whole suite of smaller local regional players after that. So, depending on the space, that competitive mix would be different depending on whether we're talking lithography or cleans or slurries.

So it's a broad mix. We're well positioned and we continue to find opportunities to increase our share position broadly across the industry.

David Begleiter

Thank you very much.

Operator

Your next question comes from the line of Vincent Andrews with Morgan Stanley.

Vincent Andrews

Thanks, and thank you again for doing this. Wondering if you can talk about as you grow what your own capacity capabilities are. I guess sort of asking will you be—can you grow organically through all these trends that you've laid out with your existing footprint or will you need to spend cap ex to grow or would you look to acquire capacity? I'm just trying to better understand how much operating leverage we should expect over the next few years.

Jon Kemp

Yes. Thanks Vincent. It's a great question. When you think about the semiconductor business broadly, it's not a hugely capital intensive business. It is—certainly there is a requirement to continue to invest in leading-edge capabilities from a product quality and purity standpoint. The application labs that we have involves some fairly sophisticated equipment to measure defects and performance that mimics a lot of what our customers do. So having that located close to customers in different regions of the world is important. We're continuing to invest to make those infrastructure upgrades at our legacy facilities, at our older facilities to make sure that we can meet the quality and purity requirements going forward.

In addition, incrementally, we'll expand the capacity as its needed. We've got already kind of a large global footprint so it's fairly straightforward for us to be able to go in and expand incremental capacity to be able to meet the needs of the industry and we'll be able to keep pace with that. In the last couple of years we've expanded capacity in Taiwan and in Korea and upgraded some of our infrastructure capabilities in the U.S. and in Japan to do precisely that. We'll continue to do that. We've got a new R&D facility coming online in Korea later this year, and we're expanding our Taiwan footprint as well.

So, that's one of the advantages that we have with critical mass in those key geographies is the ability to be able to scale up fairly consistently and easily versus having to make some of the larger greenfield investments in those geographies.

Vincent Andrews

And just as a follow-up, you mentioned earlier on R&D that you have what you think is one of the highest R&D as a percent of sales. Is it fair to assume then that your gross dollar spend on R&D is also probably one of the largest in the industry to the extent that you know?

Jon Kemp

Yes, absolutely. I think that's true just based on our relative size is generally on the larger side versus kind of the competitive peer set. So with the size of the business as well as the rate, that gives us the flexibility to continue to invest in the leading-edge innovation with our customers.

Vincent Andrews

Thanks very much.

Operator

Your final question comes from the line of John Roberts with UBS.

Josh Spector

Yes. Hey everyone. This is Josh Spector on for John. I was wondering if you could comment on some of the more recent industry dynamics, specifically in CMP slurries. I mean, one of your key competitors has talked about some share shifts within Asia on and off over the past year. We haven't really heard that

from DuPont. So, curious what you're seeing from an industry level and if there has or hasn't been any impact from a DuPont perspective.

Jon Kemp

Yes. Thanks Josh. I think as it relates to the CMP business, obviously, that's a big part of our portfolio. We really like the position that we have there both in pads and in slurries. We're continuing to grow that business. Its growth rate I think has been—we're pleased with that. I think kind of the share—there's been some minor shifts in share position across the industry over the last couple of years. I guess I would characterize it and say that hasn't had a dramatic effect on our business. There's constantly some turnover within the industry. As you get new opportunities to qualify and get specified on new architectures and new customer opportunities, we compete with that on a consistent basis based on the track record that we have in the industry, the customization that we do for the unique process steps, and then the technology that we have and we've been able to maintain that strong position and even expand it within the CMP space over the last few years.

So, we like our position and we'll continue to grow it.

Josh Spector

Thanks, that's helpful. If I could just ask on the packaging and the assembly side? The lines between what you guys are doing in semi versus some of the interconnect materials of printed circuit board chems, it's continuing to blur, and obviously DuPont has a larger scale in the semi side but also has scale in the interconnect side. Can you just talk about how DuPont's portfolio maybe might have an advantage there or where there's areas where you could win? And just to the extent that you're seeing more blurring of that line are you seeing any increased competition from competitors that maybe weren't involved in the semi side that have experience in the metalization side in the business?

Jon Kemp

Yes, it's a great question Josh. You're absolutely right. As the lines and spaces get smaller on the circuit board side and the capability and functionality become greater on the chip side, you get some blurring of the lines and it's becoming a very gray area. I think that the packaging space continues to be an area ripe for opportunities for innovation. As you get to kind of the smaller and smaller geometries on the processing nodes, the step changes in performance and costing area, shifts from the chip to the package and we're seeing more and more people in the value chain, both from the board side as well as from the fab and the IBM (phon) side to get interested in the packaging space.

Our portfolio, because we participate with customers both on the interconnect side at the board level, as well as with the existing OSATs and fabs at the chip level, we're really uniquely positioned to have such a strong portfolio on both sides of that equation. So, whether the end solution ends up being a board-driven solution, we're actively on the cutting edge of innovation there, whether it's through metalization chemistries, dielectric substrates, photoresist or whatever technology is necessary to enable that to happen, and whereas a lot of the other players in the market, the most overlap in that space, really tends to be in the metalization space, but that is fairly limited to a single product line and a lot of that optimization is going to involve putting together multiple material sets in a fairly complex package.

And so we feel really good about our ability to continue to partner with customers on both sides of that equation to help enable that transition to those more advanced leading-edge architectures and structures.

Josh Spector

Got it. Thank you.

Patrick Fitzgerald

Thank you John, and thanks to everyone for joining today. We hope you found this teach-in helpful to better understand the semiconductor technologies business. If there are additional questions, our Investor Relations team is happy to have a follow-up discussion with you.

As a reminder, today's webcast was recorded, and will be available for replay, along with a slide presentation on the Investor Relations section of the DuPont website.

We will hold our next teach-in session on November 17, covering the interconnect solutions business within E&I. Details will be posted to our website. We hope you can join us.

Thank you again and have a good day.

Operator

This concludes today's conference call. Thank you for participating. You may now disconnect.