



The Single-Source Partner for Photonic Solutions



From the smartphones in our pockets to the vast data centers supporting the internet and from the electric scooters to hypersonic aircraft, each one of these is powered by an impossibly small piece of silicon – an integrated circuit (IC) or chip. According to the U.S. Semiconductor Industry Association (SIA), there are more than 100 billion chips in daily use around the world today – a staggering number that’s equal to the number of stars in our corner of the Milky Way galaxy! These nanometer (nm)-sized marvels are the basic building blocks of modern computation and undoubtedly the basis of our modern world. And it’s their computational power and memory capacity that would shape the technology landscape of tomorrow.

Notably, the aim of the chip manufacturers has always been to shrink the size of these chips and cram in more and more functionalities per square millimeter, which would ultimately improve the overall processing power. The guiding light for the semiconductor industry on this trajectory has been Moore’s Law, an expectation that the industry innovates at a pace by roughly doubling the density of transistors on the chips every two years. But

the key to enabling this multiplication is the wavelength of the light used in the lithography process; the shorter the light wavelength, the more transistors can be etched onto the silicon wafer. While chip manufacturers had been relying on deep ultraviolet (DUV) lithography (248 nm or 193 nm wavelengths) for the past two decades to extend Moore’s law, they have now entered the extreme ultraviolet (EUV) era. EUV lithography uses light of an extremely short wavelength (13.5 nm), which would enable the industry to continue its streak with Moore’s law and gradually manufacture chips that go even beyond the nm range. However, to pursue this phenomenal stride, semiconductor OEMs require the integration of cutting-edge optical solutions.

For instance, as the chips continue to shrink in size, manufacturing processes increasingly necessitate higher-resolution illumination and imaging, better performance, and stern contamination control. Precisely because of these reasons, manufacturers are consequently vying for leading-edge optical technology and solution providers who can cater to the complexity of their challenges while bringing the next-generation methodologies and products to the market.

Enter Excelitas Technologies, a leading industrial technology manufacturer of innovative photonic solutions that enable a diverse range of leading-edge, end-to-end photonic subsystems in the DUV and EUV space.

Excelitas Technologies provides an extensive portfolio of photonic solutions, ranging from light sources to sensors (and everything in between) to OEMs and end-user customers across a wide array of sectors. What’s driving Excelitas Technologies ahead in the semiconductor space is its four decades of expertise in offering sophisticated, end-to-end photonic solutions, from concept and design, through prototype and production. The company offers high-performance photonic components, modules, and systems to enable and serve applications in lithographic production, holistic metrology, wafer inspection and processing, and chip bonding and packaging.

The Go-To Photonics Partner for Semiconductor Equipment OEMs

“Semiconductor manufacturing necessitates a very high level of precision and reliability at the optical component level, be it the precision fabrication of a lens, the ruggedness of its coating, or its exacting integration into a larger module or subassembly,” says Mario Ledig, senior director, business segment semiconductor at Excelitas Technologies. Excelitas has a remarkable portfolio of component technologies on that front, including ultra-precise optical fabrication, advanced coating techniques, complex optomechanical integration, and so on. Not to mention Excelitas’ ability to deliver prism assemblies that have arc second level tolerances, best imaging performance and illumination uniformity, and unique mounting technologies, which can optimize the performance of a diverse range of processes. “Through these leading-edge capabilities, we are constantly delivering the highest performance semiconductor coatings on the top-tier precision polished surfaces with the least amount of contamination,” remarks Trey Turner, vice president, R&D at Excelitas Technologies.

To facilitate the delivery of such advanced semiconductor solutions in a customized way, the team at Excelitas maintains a close strategic alliance with their clients. “We always align our investment strategies—be it on our technology, facilities, or personnel—with the roadmap of our clients,” notes John Rydström, senior director, global semiconductor sales at Excelitas Technologies. Interestingly, that has also been helping Excelitas Technologies stay ahead of the technology curve in the ever-evolving semiconductor market. The new state-of-the-art ISO Class 5 cleanroom facility that the company opened in Goettingen, Germany, maintains all the protocols required for next-generation DUV and EUV systems and is a perfect testament to their pioneering potency. “Where our peers

“**What’s driving Excelitas Technologies ahead in the semiconductor space is its four decades of expertise in offering sophisticated, end-to-end photonic solutions, from concept and design, through prototype and production**”

precision manufacturing sites in Asia with design and development that happens in Europe, North America, or Asia, to effectively cater to the varied client needs,” mentions Turner.

To that extent, Excelitas Technologies fosters long-term strategic relationships with some of the world’s leading players in the DUV and EUV space. How Excelitas Technologies combines its breadth of products and intelligence across the domain to aid these clients can be best reflected from a major client success story. The company was onboarded by one of the world’s leading complex lithography system manufacturers to co-develop and produce a set of metrology modules that are required for the core part of their machine. The team at Excelitas consequently played a pivotal role in ensuring various critical functionalities during the process, such as the uptime of the scanner, the number of wafers produced per hour, and the ability to exchange metrology modules on the machine. The client was thus able to ramp the product into volume production within a year while also marking a significant breakthrough in the lithography process itself. Excelitas is currently working closely with the client as they are already moving into the next generation of this system.

Riding on the coattails of such customer success stories, Excelitas is at the forefront of the photonic solution providers for the semiconductor industry today. The company’s capability in efficiently catering to all the requirements of a semiconductor equipment OEM—quality, logistics, cost, technology, and sustainability—makes it one of the leading contenders within the space. As the industry is set to keep going at a certain pace extending Moore’s law and the next-generation EUV and DUV systems are about to take center stage, Excelitas Technologies is well set to propel its semiconductor partners on this astounding endeavor. ☺

are now announcing new sites and facilities to address the chip shortages, we had made those strategic decisions years ago, and now we are supporting our customers from this fully functional site,” enthuses Rydström.

Such a forward-looking strategy has also aided Excelitas Technologies in establishing an extensive global footprint. The company has huge development sites, cleanrooms, and wafer fabs spread across Europe, North America, and the APAC region. It subsequently allows Excelitas Technologies to more closely cater to clients’ needs in those regions. Scott Orr, senior director, global marketing at Excelitas Technologies, states, “This regionalized approach allows us to better meet the needs of our global clientele in fulfilling the unprecedented demand for semiconductor chips.” Adding to it is the company’s developmental agility, which consequently provides much cost flexibility to their offerings. “We can complement our high-