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SkyWater Positions Itself for a U.S. Chip Revival

By George Leopold

Fresh off a successful initial stock offering, the chipmaker that bills itself as America's only pure-play technology foundry is gearing up to fill gaps in the Western chip-manufacturing supply chain.

Bloomington, Minnesota-based SkyWater Technology is a recent entrant in the latest version of EE Times' Silicon 100. SkyWater's

growing portfolio spans microfluidic chips for DNA sequencing and cutting-edge quantum circuits, along with carbon nanotubes and radiation-hardened devices, making it a trusted supplier to the U.S. military and aerospace customers.

SkyWater surfaced in 2017 when its parent holding company, Oxbow Industries,



President Joe Biden displays a SkyWater Technology wafer during a recent White House tech summit. (Photo credit: Patrick Semansky, AP)

acquired Cypress Foundry Solutions' 200-mm fab in Bloomington for \$30 million.

SkyWater completed its initial public offering on April 23, trading under the Nasdaq ticker symbol SKYT. The stock offering raised just over \$112 million. SkyWater's stock opened at \$17.74 per share and hit a preliminary 52-week high of \$29.91 per share on May 24. It has since settled in at just over \$26 per share. The startup's stock had jumped 26% in late May after it announced its participation in a Google-backed community chip design platform called Efabless.

The chipmaker is focusing its 200-mm wafer operations on smaller volumes for niche markets, targeting "relaxed" dimensions rather than bleeding-edge production nodes, said Thomas Sonderman, SkyWater's voluble president and CEO. Among the goals is investing in new materials such as 90-nm carbon nanotubes and emerging capabilities such as system-in-package and wafer-level manufacturing while "de-risking" high-stakes foundry operations.

"Obviously, it's going to be important to invest in innovation tied to what's going on post-Moore's Law," Sonderman said in an interview. "The idea that we're going to somehow catch up with TSMC — I don't think that's going to happen." Taiwan Semiconductor Manufacturing Co., which is estimated to possess two-thirds of the world's extreme-ultraviolet process technology, has "the EUV capacity [and] capability. Samsung is going to stay on [TSMC's] heels, of course."

Meanwhile, "Intel is trying to decide whether they're going to be a product company or a services company," Sonderman said.



Thomas Sonderman, SkyWater's president and CEO, sees a niche for "relaxed" chip dimensions.

Like its U.S. partner, GlobalFoundries, SkyWater sees plenty of growth opportunities for its "relaxed" dimensions in volume automotive and custom applications. Meanwhile, it is working with government and university labs to advanced rad-hard devices using carbon nanotube technology.

Lately, SkyWater has been attracting the attention of politicians, including President Joe Biden, who have at last come to the realization that semiconductors are a strategic asset. The president recently displayed a SkyWater wafer at a White House technology summit focused on easing the semiconductor shortage. In early June, Senator Amy Klobuchar and other Minnesota politicians toured SkyWater's expanding facilities.

To reestablish leadership in semiconductor manufacturing, startups like SkyWater are leveraging government largesse to increase

R&D investment. "We're good at taking technologies out of incubation, moving them into technology validation, and then commercializing them into an effective platform," said Sonderman.

Chip development kits, design tools, and the process technology "all come together in these emerging platforms," he said.

Advanced packaging technologies are widely seen as another way Western chipmakers can revive domestic manufacturing.

For example, the 90-nm carbon nanotube project funded by the Defense Advanced Research Projects Agency (Darpa) "is really about how you take a mature node like 90 or 130 nanometer and extend it to deliver sub-10-nm performance by using new materials," added Sonderman.

Advanced packaging technologies are widely seen as another way that Western chipmakers can revive domestic manufacturing. Hence, startups like SkyWater are attracting private and government investment in emerging areas such as system-in-package technology. That capability addresses advanced processor designs that incorporate multiple chips, requiring new interconnects.

"This is not only an area where the U.S. can really demonstrate leadership, but I think

it's an area where we're going to have a lot of domestic capability," said Sonderman. "That's kind of what's going to happen post-Moore's Law, right?"

System-in-package would enable integration of advanced and relaxed nodes. "Then you integrate together through the package as opposed to trying to do all that at the chip level; that's going to be a real driving force over the next decade," he added, with Florida emerging as a hotspot for advanced packaging.

The small but growing list of U.S. chipmakers are well-positioned to benefit from Washington's realization that semiconductors are a strategic commodity. SkyWater and its larger foundry competitors are closely tracking the congressional debates over funding a U.S. chip revival. Sonderman and his staff were fully informed on the course of the funding debate and the resulting IC manufacturing roadmap needed to revive the domestic industry.

(The Senate passed the United States Innovation and Competition Act on June 8. The measure includes \$52 billion for semiconductor research, design, and manufacturing initiatives.)

Pronouncing himself satisfied with SkyWater's IPO, the initial market response, and the prospect of helping revive Western chip manufacturing, Sonderman declared: "We're just getting started."

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