EUV Lithography: ASML will shoot tin droplets 300,000 times per second

ASML's exposure systems are expected to expose around 50 percent more wafers by 2030 than before. This requires complex technology.

Render image of an open lithography system from ASML. Pictured is a Twinscan NXE:3800E (Low-NA EUV). (Image: ASML)

Feb 24, 2026 at 4:03 pm CET 4 min. read

By Mark Mantel

ASML has reached a new research milestone: a pre-series lithography system with an extreme ultraviolet (EUV) light source increases exposure power from 600 to 1000 watts. This, in turn, shortens the time a system needs to expose chip structures on a silicon wafer.

The technology is expected to be ready for mass production by 2030. A lithography system should then be able to expose 330 wafers per hour – 50 percent more than previous models like the Twinscan NXE:3800E manage to achieve. Chip or memory manufacturers such as TSMC, Samsung, SK Hynix, Intel, and Micron could thus significantly increase productivity in the same cleanroom area.

After that, 1000 watts is not the end of the road: ASML sees a clear path to 1500 watts and no fundamental reason why 2000 watts should not also be possible.

Complex light source in EUV lithography

The 1000 watts refers to the power at the light source. The lasers, including upstream amplifiers, already achieve power up to 40 kilowatts today, but cannot emit the necessary light with a wavelength of 13.5 nanometers themselves.

Instead, current EUV systems guide 50,000 tin droplets per second into a chamber. A laser shoots at each of these droplets twice, i.e., 100,000 times per second: once to pre-form it into a pancake-like shape and then to heat it. This creates a plasma from the tin that emits light with the desired wavelength of 13.5nm.

To increase the light output, ASML is doubling the number of tin droplets to 100,000 per second. At the same time, the manufacturer is increasing the laser pulses to three shots per droplet: two for pre-forming and one for heating. This results in 300,000 laser pulses per second.

This brings its own set of problems, including potential contamination from tin splatters. These were one reason why EUV was not ready for series production for years. Today, less tin splatter is produced due to pre-forming by laser, and the chamber is built modular, allowing for cleaning.

Several highly pure mirrors and lenses direct the light to the wafer. Because each optical component absorbs light, only a fraction of the energy reaches the wafer; ASML does not disclose exactly how much.

The optics system is supplied by the German company Zeiss. The lasers and amplifiers come from the also German supplier Trumpf.

Tests already successful

Tests with the 1000-watt light source were already conducted in 2025 at a research facility in San Diego, California, USA. The commercial goal by 2030 was first reported by the news agency Reuters.

When asked by heise online, an ASML spokesperson emphasized that the tests so far represent a research milestone and not a commercial one. In the coming years, the manufacturer will focus on industrialization: besides the light source, other components such as the scanner require adjustments. It must permanently withstand the higher power and move the exposure masks quicker.

"It's not a parlor trick or something like this, where we demonstrate for a very short time that it can work," Michael Purvis, ASML's lead technologist for its EUV source light, told Reuters. "It's a system that can produce 1000 watts under all the same requirements that you could see at a customer."

The test was conducted with a so-called low-NA lithography system, i.e., one with a low numerical aperture, such as TSMC and others have been using for years. However, the principle is also transferable to

even more complex systems with high numerical aperture (high-NA EUV), which will be used in series production starting in 2027. Both types use largely identical light sources, just with different orientation.

Read also

Lithography systems: Record orders for ASML due to AI

In the best-case scenario, the necessary modules can be exchanged in existing lithography systems. With upgrade modules, ASML generates several billion euros in revenue per year. However, the manufacturer cannot currently confirm whether upgrades will be possible in this case.

(mma)

This article was originally published in German. It was translated with technical assistance and editorially reviewed before publication.

Home

Shortlink: https://heise.de/-11187649

Beliebte Bestenlisten

Alle bestenlisten →

Top 10: Speicher für Balkonkraftwerk im Test

bestenlisten

Testsieger: Die beste Funk-Rückfahrkamera mit Akku

bestenlisten

Top 10: Mähroboter ohne Begrenzungskabel im Test

bestenlisten

Telepolis
heise autos
bestenlisten
tipps+tricks

Services

heise shop
heise jobs
heise academy
heise download
heise preisvergleich
Tarifrechner
heise compaliate
Abo bestellen
Mein Abo
Netzwerktools
iMonitor
Loseblattwerke
Spiele

Über Uns

heise medien
heise regioconcept
heise business services
Sponsoring
Mediadaten
Karriere
Presse

Back to top