

Canon prepares to ramp nano-imprint lithography – December 12, 2022



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By Peter Clarke

After eight year of R&D and limited sales Canon is preparing to ramp production of nanoimprint lithography chip manufacturing equipment for the market.

Canon is building a factory in Utsunomiya, in Tochigi prefecture north of Tokyo, at an estimated cost of 50 billion yen (about US\$366 million). The factory will be used to make KrF and i-line lithography machines but also to increase nano-imprint lithography (NIL) machine production. Operations are scheduled to begin in 2025.

KrF and i-line lithography are mature techniques but they are still used for numerous to define numerous IC types, MEMS and flat panel displays. NIL can also be used at these relaxed geometries but has the scope to define much finer structure dimensions at 10nm and below.

In a presentation to analysts accompanying Canon's 3Q22 financial results Fujio Mitarai, chairman and CEO, said the company was at the final stage of adjustment for the use of NIL in mass production. Mitarai said that Canon had been working with the New Energy and Industrial Technology Development Organization (NEDO), a national R&D agency, since March 2021 when NIL had been selected as an R&D project.

Canon moved into NIL through the acquisition of Molecular Imprints Inc. (Austin, Texas) in 2014 which it renamed Canon Nanotechnologies Inc. The company claims that its version of the technology can nano-imprint features down to 10nm and below at very low cost. This could make the technology an alternative to the highly expensive extreme ultraviolet (EUV) lithography being used by TSMC, Samsung and others. Molecular Imprints was founded in 2001.

China interest?

The origins of Canon's NIL technology in the US means it is likely fall under the same export controls as EUV lithography from ASML Holding NV has been subjected to, preventing sales into China.

The vast amounts of research time spent improving EUV, characterizing it and accelerating wafer throughput give EUV an incumbent's advantage at least for leading-edge logic production. NIL does have opportunities in characterizing novel technologies behind the leading-edge in miniaturization – such as photonics, laser gratings, silicon interposers, MEMS and power devices.

Canon did not mention particular chip makers that would be purchasing NIL machines. However, NIL could be better suited to defining ICs with a high-degree of repetition such as memories including DRAM, NAND flash and 3D-NAND flash. Canon has a NIL machine installed at Kioxia's Yokkaichi fab complex.

Other producers of nanotech lithography equipment include EV Group, SUSS MicroTec and Obducat AB.

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