Lithography for now and for the future

V. Banine and J. Benschop
ASML Inc., The Netherlands

Optical lithography has supported multiple generations of the scaling of the integrated chip production, known as Moore's Law: the doubling of the number of transistors in a chip every 18 months.

While the state-of-the art immersion lithography tools with a numerical aperture NA = 1.35 and high throughput are the main workhorse of the semiconductor industry, multiple patterning is required to obtain ~10–16 nm half-pitch. The next step to extend the Moore's Law for the coming decade will be the transition to extreme ultraviolet (EUV), corresponding to 13.5 nm light, accepted by the semiconductor industry for fabrication beyond the 10 nm node.

After a short introduction of IC-making in the past, we will discuss the present and future of lithography. This includes state-of-the-art demonstration of the EUV systems capabilities, discussion of critical EUV technologies (high-power sources, masks and resists), as well as view of their further evolution in the future.