EUV RETICLES: NANOSCALE, PARTICLE-FREE HANDLING IN THE PELLICLE-LESS ERA

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Quick and accurate positioning of EUV reticles inside EUV Litho tools is of essential importance to fulfill industrial requirements for lithographic functionality like throughput and overlay. An additional challenge for EUV reticles is related to particle contamination. EUV radiation is highly absorbing both in materials and gases. As a consequence, EUV Lithographic systems operate in vacuum and pellicles, used in current lithographic systems to protect the reticle from particle contamination, can no longer be used. This means that without countermeasures, particle contamination is likely to occur. Typical actions that can lead to particle production include picking up or releasing a reticle (mechanical contact), storing a reticle (clean environments) and bringing a reticle from atmosphere to vacuum (dislodging of particles in the flow).

Within the ASML EUV program, TNO and ASML have co-developed strategies to quickly load and accurately position reticles onto the reticle stage whilst simultaneously mitigating particle contamination on reticles during these handling actions and during storage near the tool. These strategies include several key developments in the field of reticle handling and loading like appropriate materials choices, handling sequences and prevention of particle migration during pump-down. In this presentation, an overview will be given of the results obtained in these fields so far.

Currently, we routinely achieve zero added particles and the developed solution is being implemented in the EUV tool.

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