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## Recent Work

### Title

Contamination removal using the Evactron(R) De-contaminator

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## **Contamination Removal using the Evactron<sup>®</sup> De-Contaminator**

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The issue of contamination on extreme ultraviolet (EUV) optics needs to be addressed in order to allow EUV lithography to become commercially feasible. Image quality in scanning electron microscopes (SEMs) can also be degraded by hydrocarbon contamination. In both systems, hydrocarbon contamination is cracked and then polymerized by either a photon beam in the case of EUV optics or an electron beam for SEMs.

The use of the Evactron<sup>®</sup> De-Contaminator, a low power downstream plasma cleaner, has been shown to be effective in removing carbon contamination from SEMs. This commercially available product has been installed on over 900 SEMs worldwide. The Evactron De-Contaminator typically uses room air to clean in a downstream process. Oxygen radicals chemically etch the surface to be cleaned; there is no sputter etch by ions. Pure oxygen can also be used. The cleaning plasma can also be created using hydrogen gas, which opens the possibility of cleaning through reduction chemistry.

The effectiveness of the downstream plasma cleaning process has also been tested on EUV mirrors at the Center for X-Ray Optics at Lawrence Berkeley National Laboratory. It has been shown that the downstream plasma is effective at removing hydrocarbons from EUV mirrors without damaging them.

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