

Sn cleaning of multi-layer mirrors with hydrogen radicals.

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To meet lifetime requirements of collector optics in Sn based EUV sources a combination of debris mitigation and collector cleaning is investigated. Analyses of the current debris mitigation status as well as potential improvement of the lifetime due to the cleaning process will be presented.

We have been working on a Sn cleaning method using hydrogen radicals. Previously, we have demonstrated the use of this technique for grazing incidence EUV mirrors, showing full reflectivity recovery and cleaning rates up to 700 nm/hour. This time, we will show the use of this method for cleaning multi-layer mirrors. Various parameters are studied, such as for example the reflectivity of the mirror before and after cleaning, or the effect of a capping layer on the cleaning efficiency.

We have done further experiments to investigate Sn cleaning under realistic EUV source module conditions and materials. Additionally, optimisation schemes have been developed aimed at speeding-up the process of cleaning. This has been evaluated since it is important for actual EUV tool optimisation, where both the effectiveness and duration of the cleaning is of concern.