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| 1. Title: | Collector optics integration into medium power EUV source systems |
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3. Abstract body:

The power level for beta-tools and high volume manufacturing EUV sources requires appropriate thermal management of the collector optics. For beta-tools, for example, xenon-fueled gas discharge sources with up to 200 W/2pi sr EUV in-band power are developed by XTREME technologies enabling an intermediate focus EUV power exceeding 10 W. Liquid cooled grazing incidence collector optics developed by Media Lario for high power sources have been integrated with a high power EUV source from XTREME technologies. The collector optics consists of more than 10 nested shells, which are liquid cooled by cooling pipes integrated on the backside of each individual shell.

Following integration, the optical performance of the system such as collection efficiency, and EUV radiation pattern in the intermediate focus and in the far-field has been measured under high source power levels corresponding to > 1 kW of thermal load on the collector optics. The thermal behavior of the collector was monitored by multiple thermocouples installed on the optics shells and the mechanical mounting interface. Thermal and optical modeling was performed for inferring the thermal load on the collector as a function of source operating conditions and for comparison with the measured values.

Intermediate focus and far-field measurements demonstrating the optical stability of the source-collector system will be discussed in this presentation.