EXTREME ULTRAVIOLET LITHOGRAPHY

1. Title:	Effect of Deposition, Sputtering, and Evaporation of Lithium Debris Buildup on EUV Optics
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3. Abstract body:

This research modeled and experimentally measured the mitigation of Li debris from collector optics through the combined use of a He secondary plasma, evaporation from optic materials at elevated temperatures and preferential sputtering off of the optic material. The application of a secondary plasma source around the surface of mirror optics contaminated with low-energy sputtered material was able to remove a significant fraction of lithium and contaminant material is removed. An analytical model was developed to give predictive values of contamination buildup on optics for related systems. While the addition of heating the optic to 400o C alone and the addition of He ion flux to the surface alone showed some promise in removal of Li debris from the surface of the optic the resulting surface roughness were about order of magnitude higher than as received mirror optic samples. However, an addition of heat and increased He ion flux to the surface together were able to reduce surface roughness back and a minimal amount of Li debris present on the surface. This demonstrates the viability of employing a secondary He plasma around the mirror optics to prolong the lifetime of the collector optics in situ with minimal EUV transmission loss.