1. Title:	Extending the lifetime of Collector optics: advanced debris mitigation schemes and cleaning methods

3. Abstract body:

A critical consideration in the development of an EUV source is collector optics lifetime, which are exposed to a large flux of energetic particles coming from the expansion of the pulsed-plasma, potentially leading to mirror damage due to erosion, layer mixing, and ion implantation. Research efforts have focused on several critical challenges facing the source-optic system. Debris spectra measurements using the ESA and neutral detector will be presented on the XTS source operating with Sn highlighting comparisons with Xe data. Ion debris is measured from a Sn-LPP source and the comparison with Sn DPP will be shown. Pre and post-exposed samples to Xe and Sn sources are analyzed and reported. This paper will present results on a advanced debris mitigation schemes such as introducing a RF plasma and mixed fuels. New Sn etching chemistries are tried and the results will be presented in detail leading to a viable Sn DPP or LPP source-optic system for HVM conditions. The ability to mitigate and clean Li debris from optics through the use of a secondary plasma have shown to keep the collector optic in an as received state through the use of a secondary plasma and elevated temperature.