



1. Title:	Contamination Control In The Projection Optics Environment
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3. Abstract body:

Mo/Si multilayer mirrors with a ruthenium capping layer have, to date, been shown as the best candidates to meet the lifetime requirement for the projection optics of an EUVL tool. The reflectivity of the multilayer mirrors is degraded by oxidation and carbon growth on the mirror surfaces and is directly related to the level of contamination in the vacuum environment and in particular to the partial pressures and surface chemistry of the various species present. The behaviour of hydrocarbon species on the mirror surface can vary significantly depending on the chemical type and the presence of secondary electrons, induced by the incident radiation.

We have investigated the uptake and cracking of different hydrocarbon species on single crystal Ru(0001) under typical, simulated, EUV incident photon conditions, by the use of low energy electrons. Alkanes, alkenes, aromatics and oxygenates have been studied and shown to have quite different adsorption characteristics. Results suggest that in order to meet the 30,000 hour lifetime requirement a typical partial pressure threshold of approximately $1\text{E-}13$ mbar is required for 'sticky' or harmful species and $1\text{E-}10$ mbar for benign or non-sticky species.

We will also update on the previously reported PPT detection level selective hydrocarbon sensor.

Keywords: Outgassing, photo-resist, vacuum, multilayer mirrors, contamination control and remediation, hydrocarbon, mass spectrometry, electrochemical sensing.