1. Title:	Radiation-induced processes on Ru surfaces: relevance to EUVL
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3. Abstract body:
In model studies of surface processes that may affect the reflectivity of Ru coatings on multilayer mirrors, we report measurements on Ru(10-10) surfaces covered by varying amounts of oxygen, using a number of surface sensitive techniques. These include Electron Stimulated Desorption (ESD), X-ray Photoelectron Spectroscopy (XPS), and synchrotron radiation methods. ESD of O-atoms and ions from O-covered Ru is initiated by electron bombardment, indicating that irradiation can introduce reactive O-vacancies in the oxide layers on mirror surfaces. The O+ ion yield rises from a threshold near 25 eV and displays structure at ~43 eV and ~75 eV associated with O 1s, Ru 4p and Ru 4s excitations, respectively. Desorption occurs due to holes created in shallow core levels, which can also be excited by 13.5 nm photons (photon-stimulated desorption, PSD). This is important because background gases in projection optics (water, hydrocarbons, etc.) are generally more reactive with radiation-generated defects (O-vacancies) than with stoichiometric oxidized surfaces. Oxygen is also removed from Ru by exposure to a low flux of atomic H, via H2O formation. Synchrotron radiation is used to measure the secondary electron yield (SEY) for clean and O-covered Ru(0001); the SEY reaches a broad minimum as a function of photon energy near 92eV (13.5nm). The SEY is lower for C- and O-covered Ru. The existence of the SEY minimum may be a factor in the increased lifetime of Ru-capped multilayer mirrors.