



1. Title:	High acceleration test for contamination of Ru capping layers for EUVL projection optics mirrors
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3. Abstract body:

Contamination study for EUVL projection optics (PO) mirrors has been performed in the NewSUBARU SR facility. Intense EUV power of 150 mW/mm² is available by using undulator radiation. This power corresponds to about 1000 times, compared with the maximum power expected in PO mirrors of EUVL production tools. Conditions to meet this kind of high acceleration test were investigated for Ru capping layers.

Dose dependence of reflectance change was measured at different EUV power densities in an atmosphere of 1.3e-5 Pa in which water is the main species. We assumed this is a typical condition in EUVL production tools. Below the power density of about 15 mW/mm², all of the measured reflectance change showed similar trends with respect to dose. But in more than 15 mW/mm², reflectance degradation with dose became smaller with increased power densities. We measured it up to 150 mW/mm²

A surface physics model suggests that water vapor pressure should be increased in proportion to photon intensity in the region where reflectance degradation is dependent on photon intensity. To accomplish meaningful acceleration test, we conducted the experiment in the pressure of 1.3e-4 Pa at 140 mW/mm². The reflectivity dropped to about 98 % of the initial value and showed somewhat saturated behavior in irradiation dose of 1200 J/mm². These were obtained in rather low hydrocarbon content atmosphere. More results and discussion will be presented.