



1. Title:	A short-pulsed laser cleaning system for EUVL tool
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3. Abstract body:

Traditional methods of reticle protection, such as using a pellicle, cannot be applied to EUVL tool. In order to resolve this critical problem, *in situ* cleaning methods of particles on reticle need to be developed. As an *in situ* method, we propose a short-pulsed laser cleaning system. This technique consists of perfect dry process, and will have easier and wider application than conventional one. In order to confirm whether it can be used inside the EUVL tool or not, we have to verify experimentally that it is possible to remove particles in vacuum without any damage to Mo/Si multilayer. In this study, Ru-capped Mo/Si multilayer mirrors are used. As organic contaminant particles, monodisperse fluorescent PSL spheres are deposited on the mirror by using an atomizer. A Q-switched YAG Laser (wavelength:266~1064nm, pulse width:~7ns) is used. Experiments are carried out in atmosphere or in vacuum. As a result, in the pressure level of $\sim 10^{-3}$ Pa, a removal rate of organic particles (size:100nm) on a Ru-capped surface is about 100%, by using laser of 266nm, energy density of 20mJ/cm², and pulse number of 400. In the above condition, it is found that there is no particular damage on the Ru-capped Mo/Si multilayer.