



1. Title:	At-wavelength evaluation of multilayer mirrors for EUV lithography
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3. Abstract body:

Projection optics of EUV lithography system consists of multilayer mirrors. Factors of wavefront aberration that is caused by multilayer are geometrical shape of deposited multilayer thickness and phase shift of multilayer reflection. Therefore multilayer mirrors are required to have not only high reflectivity but also precise layer thickness distribution and controlled phase shift.

To manufacture of multilayer mirrors, we developed an EUV reflectometer*, which is installed in a factory and fully automated. To make the reflectometer small enough, we adopted a compact laser produced plasma light source instead of SR. The reflectometer has a reflection type polarizer that can easily select polarization. The reflectometer also has a function to measure a phase shift of a multilayer mirror with using EUV standing waves**.

In this presentation, we will present measurement results of reflectivity, layer thickness and phase shift of curved multilayer mirrors. The measurement result of layer thickness distribution of a mirror shows good agreement with the results of surface shape measurements. The measurement resolution of phase shift was achieved $1\text{m}\lambda$ for plane mirrors. We are making arrangements to apply phase shift measurements to curved mirrors.

* A. Miyake et.al, Proc.SPIE **5037**, 647(2003)

** A. Miyake et.al, J.Vac.Sci.Technol.B **22**(6), pp2970-2974 (2004)