

## In-situ stress measurement of thin film and multilayer deposition

Johan Reinink, Robbert van de Kruijs, and Fred Bijkerk  
Industrial Focus Group XUV Optics, MESA Institute for Nanotechnology, University of  
Twente, P.O. Box 217, 7500 AE Enschede, The Netherlands

The growth of thin films is often accompanied by a strain induced surface stress. This strain depends on the growth mode (e.g. amorphous, crystalline), and modifies the electrical, mechanical and optical properties of the thin film, down to atomic film thickness.

We measure the stress development during deposition of Mo/Si based multilayers, used as optical coatings in EUV photolithography. We use a laser deflection based measurement setup. The measurements reveal the stress development of the crystallization of the Mo layer and the interface formation of Si on Mo in a real-time mode during growth. The effect of ion treatment of layers on stress is also investigated. Several deposition conditions are varied and barrier layers are added to determine their influence. Measurement results show several possibilities for stress engineering.