



1. Title:	Accuracy of the ASET Dilatometer for Low Thermal Expansion Materials
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3. Abstract body:

In order to eliminate errors in printed patterns caused by the thermal expansion of the optics and the mask substrate, EUVL requires a material with an ultralow CTE of less than ± 5 ppb/ $^{\circ}\text{C}$ between temperatures of 19°C and 25°C . We have developed an optical-heterodyne-interferometric dilatometer tailored to meet EUVL requirements. The static reproducibility (σ) is 0.80 ppb/ $^{\circ}\text{C}$ or better for a change of 1 ppb/ $^{\circ}\text{C}$ in the target. The resetability is ± 0.85 ppb/ $^{\circ}\text{C}$ or better. These values meet the target specifications. Regarding measurement accuracy, our data were compared with those obtained with the AIST dilatometer that is used for Japanese national standard. The benchmark test results showed the difference to be 1.7 ppb/ $^{\circ}\text{C}$ for an LTEM (Ti-doped silica glass). To meet the target specifications (< 1 ppb/ $^{\circ}\text{C}$), we are continuing our investigations into the accuracy of our dilatometer and improving it. The results will be reported in the symposium. This work was supported by NEDO.