Enhanced thin film characterization through combined S- and P-polarized EUV reflectometry

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Abstract

This work investigates the potential benefits of employing combined s- and p-polarized extreme ultraviolet (EUV) reflectometry for the accurate and efficient determination of thin film optical constants and geometrical parameters. EUV reflectometry (EUVR) is a powerful non-destructive technique for characterizing thin films, which is crucial for advancements in fields such as lithography and nanotechnology.

Our study compares three distinct data analysis approaches: utilizing s-polarized, p-polarized, and a simultaneous combination of both s- and p-polarized EUV data. Through iterative calculations, we observe that while s-polarized data can yield reliable results, it may sometimes require more iterations to converge. Analysis of p-polarized data alone appears to offer different sensitivities and, in some instances, might accelerate convergence.

The most promising results are achieved when fitting both s- and p-polarized EUVR data simultaneously. This combined approach appears to lead to a faster convergence rate compared to using either polarization independently. Furthermore, the uncertainty in the calculated optical constants and geometrical parameters seems to be reduced, possibly leading to more reliable results. Our findings suggest that the simultaneous utilization of s- and p-polarized EUVR data could offer an effective methodology for rapid, robust, and accurate thin film characterization.