Stand-alone extreme ultraviolet spectrometer for structural and optical characterization tasks

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The authors present their recent work on the measurement capabilities and accuracy of the stand-alone extreme ultraviolet (EUV) spectrometer at RWTH Aachen University. The EUV spectrometer is a compact metrology tool for structural and optical characterization tasks in the fields of nanoscience and semiconductor industry [1]. By measuring the reflectance of a sample over a defined spectral and angular range (see Fig. 1), sample parameters are reconstructed in a model-based approach. The use of a compact discharge-produced plasma (DPP) EUV radiation source [2], providing unpolarized and broadband emission, results in a small tool footprint (see Fig. 1) and short data acquisition times. These features qualify the EUV spectrometer for the use in laboratories as well as for in-line process control applications [3,4].

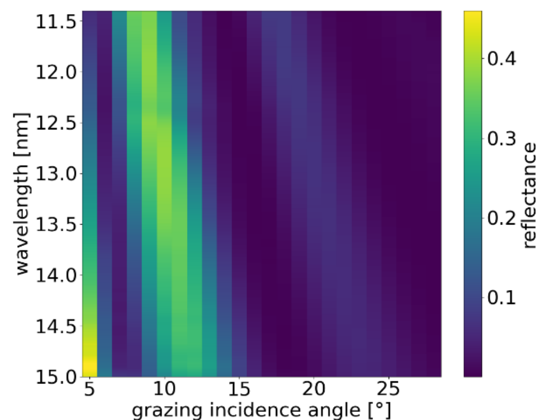

Fig. 1 *Left: Photograph of the stand-alone EUV spectrometer. Right: Map of experimentally obtained reflectance data of a nanostructured sample serving as a basis for sample parameter reconstruction.*

Recently, the authors have implemented several hardware upgrades to the EUV spectrometer including measures to improve the thermal stability of the EUV detectors and an extension of the angular range of up to 30° grazing incidence. It has been shown that these upgrades improve the accuracy of the data analysis by up to one order of magnitude [5]. Additionally, updates to the data analysis algorithms have been implemented that account for the polarization degree of the EUV radiation and thereby further enhance the accuracy of the data analysis.

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[5] S. Schröder et al., 2020, Proc. SPIE **11517**, 115170S.