

EUV Beam Line 2 (EBL2) in commission: operating the EUV optics lifetime test facility

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Since 2015 TNO has been developing a second Extreme-UV irradiation facility: the EUV Beam Line 2 (EBL2). After starting the design in 2015, the tool was built in 2016, qualified in 2017, and accessible for customers since 2018. In typical experiments EUV optics/samples are exposed to radiation around 13.5 nm in a controlled vacuum environment to assess their lifetimes.

The key parameters for exposures are radiant energy and radiant exposure. Measuring the EUV radiation – at the source (radiant intensity and radiance), intermediate focus (irradiance) and at sample level (irradiance and radiant flux) – is a recurring aspect in the facility's operation. This is accomplished by a combination of CCD cameras, photodiodes, scintillator and dosimetry. Moreover, directing the EUV light to the right location on a sample is crucial. A combination of scintillator and imaging techniques is used for adequate alignment. Other important aspects are the spectral output of the source, the transmission through the optical system, and the spectral response of the sensors.

In this presentation, the various sensors are discussed with emphasis on their properties, performance and calibration. Additionally, there is a brief review of the sample analysis capabilities of EBL2 including an outlook on additional analysis tools currently under development (such as reflected beam-monitoring for in-situ reflectometry of EUV optics).