
Contribution ID : **109** Type : **Poster**

# Comprehensive Physical Optics Study of Mask Roughness in EUV Interference Lithography

Extreme ultraviolet interference lithography (EUV-IL) is a conceptually simple and experimentally powerful method for patterning periodic nanostructures. EUV-IL using synchrotron radiation has recently emerged as a powerful tool for understanding the challenges involved with transitioning from 13.5 nm to 6.x nm wavelength sources [1,2].

At the ANSTO Australian Synchrotron, a new EUV-IL exposure and metrology instrument is in development for installation at the Soft X-ray (SXR) beamline. A comprehensive model of SXR APPLE-II undulator source, beamline optics and the endstation has been constructed using Synchrotron Radiation Workshop (SRW) physical optics code to evaluate the achievable lithographic performance at 6.7 nm wavelength [3]. Source properties such as polarisation and coherence, as well as mask geometry and roughness – including surface roughness, line-edge, and line-width roughness – were modelled to study the effect on the quality of the aerial images.

Multiple quality metrics were evaluated for their sensitivity to the effects of roughness magnitude and roughness correlation length. The results of this study provide a basis for the optimization of source properties, mask design and lithography processes that will be applied at the SXR beamline.

[1] Mojarad, N., Vockenhuber, M., Wang, L., Terhalle, B., & Ekinci, Y. Extreme Ultraviolet (EUV) Lithography IV (Vol. 8679, pp. 616-622). SPIE. (2013).

[2] Mojarad, N., Gobrecht, J. & Ekinci, Y. Sci Rep 5, 9235 (2015).

[3] Knappett, J. Diss. La Trobe University, (2021).

## Level of Expertise

Student

## Presenter Gender

Man

## Pronouns

He/Him

## Do you intend to attend UM2022

In person - Melbourne

## Students Only - if available would you be interested in student travel funding

No

## Students Only – Do you wish to take part in the Student Poster Slam

Yes

## Terms and conditions (Please confirm that you have read all the requirements and agree to the conditions)

Yes

**Primary author(s) :** Mr KNAPPETT, Jerome (La Trobe University)

**Co-author(s) :** VAN RIESSEN, Grant (La Trobe University)

**Presenter(s) :** VAN RIESSEN, Grant (La Trobe University)

**Session Classification :** Poster

**Track Classification :** Advanced Materials & Hard Matter