Progress in the optics usage programme for ASML EUV Lithographic Tools

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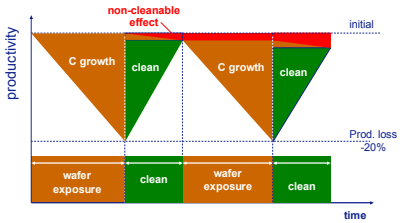
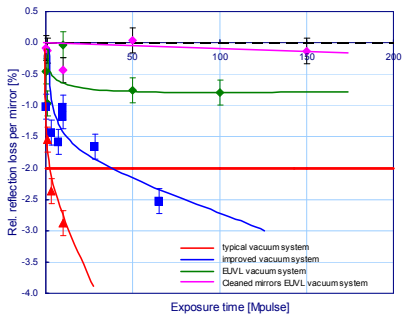
Introduction

In order to make EUV economically viable, optics usage should be in the range of 7-10 years (tens of thousands of illumination hours).

The ASML strategy to reach the specification for optics usage includes:
- good vacuum
- reduced C-growth
- improved oxidation resistance of mirrors
- fast carbon cleaning, without mirror degradation

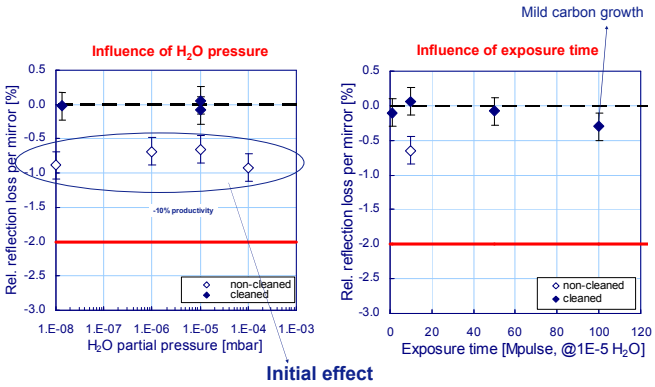


Optics reflectivity is influenced by C-growth

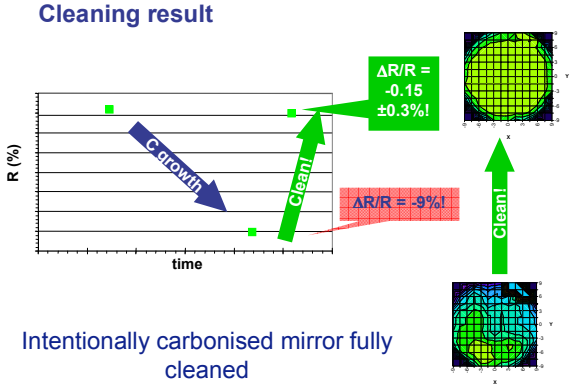


Given experimental data, we expect mild carbon growth for lithotool vacuum environment

Optics reflectivity is not influenced by H_20

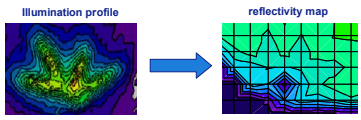


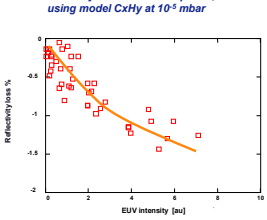
Cleaning result

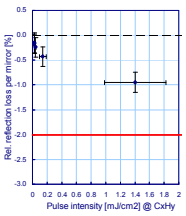


Intentionally carbonised mirror fully cleaned

Amount of C-growth on mirror depends on EUV intensity and hydrocarbon (CxHy) partial pressure





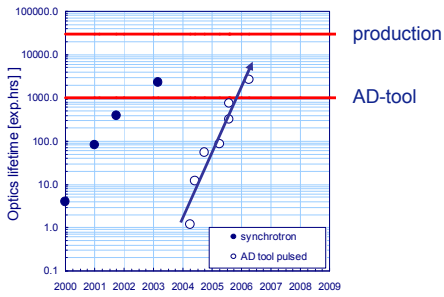


- The first mirrors in the illuminator see the highest EUV intensity and thus the highest carbon growth rate
- Intensity at the POB mirrors is substantially lower

Summary

- Carbon growth expected in lithotool
- No oxidation expected
- Optics degardation intensity dependent
- Cleaning proven and implemented

Progress in Optics Usage



Acknowledgements: FOM Rijnhuizen, Philips Eindhoven, PTB Berlin, ALS Berkeley