Frontiers of EUVL Technology Challenges

Focusing on EUVL Infrastructure in the 2019 EUVL workshop

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As EUVL comes into production at the 7 nm node, the focus of the 2019 EUVL workshop (June 11-14, 2019, CXRO, LBL, Berkeley, CA) will shift from the scanner to mask, resist, stochastics, power scaling of EUV sources and EUVL extension beyond High NA. I am excited about what we expect to hear from the industry's leading experts on these topics, and want to share some of the highlights.

As always, I am looking forward to excellent keynote talks. Intel will deliver a keynote on their EUVL program. Watanabe-san from Hyogo will describe the latest from Japan's EIDEC programs, and AMAT will talk about their semiconductor roadmap to support current and future nodes. We also will have a talk on quantum computers by Prof. Irfan Siddiqi, a technology leader in quantum computers from LBL and UC Berkeley.

For masks, the challenge of needing a newer, thinner mask absorber will be addressed by AMAT, Veeco and UCLA. In addition there will be papers on pellicles and mask stochastics. Anna Lio of Intel will propose a new paradigm for resist development in the near and long term future. Carl Zeiss also will give an update on optics for EUVL scanners, and there will be several papers on scanners and metrology sources, resists and masks.

As scanners will continue to enable future nodes, we will need more source power. One way to get it (which not only gives higher throughput but also supports scaling) is to increase the conversion efficiency of EUV sources. One method may be to change the drive lasers from 10 micron CO_2 lasers to 2 micron thulium lasers. We will have papers on modeling that will explore this switch and describe these lasers. They also may enable EUVL extension by driving shorter wavelength sources, as one option for EUVL extension beyond high NA is Blue-X, the wavelength reduction to a yet undecided region. In addition to thulium lasers, which may drive shorter wavelength sources, we also will need to explore ML with high reflectivity in the wavelength region of in 1-10 nm. Two papers will explore the latest on ML development in the water window region, where we may have future wavelengths for next-generation scanners.

In addition, we will offer an EUVL short course on Monday of the workshop. On Tuesday, there will be a Showcase of Research Programs and Facilities at CXRO, which continue to take a leading role in the development of infrastructure for EUVL. I will write more about these topics in my next blogs. Overall, we are

anticipating a very nice collection of presentations by industry leaders on EUVL infrastructure challenges. I look forward to seeing you there. The detailed agenda and abstract book is available at www.euvlitho.com.