EUV Lithography Short Course

Monday, 8:30 AM – 4:30 PM, June 13, 2016

Room 66-136 LBNL, Berkeley, CA, USA

Course Overview

This course provides attendees with a full overview of the fundamentals, current status, and technical challenges of EUV Lithography. Topics covered include EUV Sources, EUV Source Metrology, EUV Optics, EUV systems and patterning, and EUV Mask. We will begin with an overview of the history of EUVL and cover EUV sources, EUV source metrology and EUV optics. Next is a discussion of EUVL systems and patterning. We cover the fundamental components of EUV systems and address similarities and differences to optical lithography systems. This section also covers patterning issues including flare, LER, and resist performance. We continue with an exploration of EUVL Mask technology issues such as design, materials including reflective multilayers, process and metrology. Finally we conclude with a Status Review of EUVL. Course material will be drawn from the accompanying texts EUV Sources for Lithography and EUV Lithography.

Learning Outcomes

- learn the history and basics of the development of EUV Lithography
- learn the basics of the different EUV source types and the current technical challenges of EUV source technology
- learn the fundamentals of EUV source metrology and source power measurements
- learn the fundamentals of EUV multilayer optics
- learn the fundamentals of EUV systems and patterning and understand the key components in EUV systems and the current technical challenges
- learn the fundamentals of EUV mask technology and understand the current technical challenges
- learn the current status and technical challenges of EUV Lithography for supporting high volume computer chip manufacturing

Intended Audience

This material is intended for anyone who is involved in the development of EUV Lithography and/or other emerging lithography techniques, needs to understand the current technology status of EUV Lithography, and is interested in learning the fundamentals of this leading patterning technology. Those who are responsible for the development of the roadmap for lithography in manufacturing and making technology decisions will find this course valuable.

About the Instructors

Vivek Bakshi is the president of EUV Litho, Inc. an organization he has formed to promote EUV Lithography via consulting, publications, education and workshops. Previously he was a Senior Member of Technical staff in the Lithography Division of SEMATECH. He has edited two books on EUV Lithography: *EUV Sources for Lithography* (SPIE Press, 2006) and *EUV Lithography* (SPIE Press and John Wiley & Sons, Inc., 2008). He is an internationally recognized expert on EUV Source Technology and EUV Lithography. He is the lead instructor for the course and the author of EUV Source Technology chapter in the book EUV Lithography.

Jinho Ahn joined Hanyang University in 1995 as a professor in the MSE department. He has been working as a national project leader for EUVL technology. He is now serving as a Director for Nano & Convergence Technology of National Research Foundation of Korea.

Patrick P. Naulleau has been involved in EUV lithography since 1997 when he joined Lawrence Berkeley National Laboratory (LBNL) to work in the area of actinic interferometric alignment. Since 2001 he has lead LBNL's EUV Patterning project starting with the 0.1-NA ETS optics and now the 0.3-NA MET optic. He is internationally recognized for leading EUV patterning studies and his contributions to EUV System designs. He is the lead author of chapter on EUV Patterning in the book EUV Lithography.

Course Material

COURSE REGISTRATION PRICE INCLUDES the text *EUV Lithography* (SPIE Press and John Wiley and Sons, Inc., 2008) edited by Vivek Bakshi and a printed copy of lecture notes.

Registration Information

Please register for short course, at www.euvlitho.com.