SPIE 2011 AL EUVL Conference

EUVL Technology Status Summary

March 3, 2011

EUV Litho, Inc.
www.euvlitho.com

β level EUVL Scanner are Shipping to Customers and Operating in Field

Next step in EUV Manufacturing integration:
2 NXE:3100 shipped, 1st operational at customer site

- Imaging
  - Resolution 27nm
  - NA=0.25
  - σ=0.8
- Overlay
  - DCO=4.0 nm
  - MMO=7.0 nm
- Productivity
  - 60wph
  - 10mJ/cm² resist

Courtesy: C. Wagner, ASML, March 3, 2011

β level EUVL Scanner Status and Improvements Over Last One Year

Progress since last SPIE
from modules to system shipment

- SPIE 2010 report was prior to 1st system completion
- NXE:3100 module verification
  - Lens
  - Handlers
  - Stages
  - Source
- 24nm imaging from ADT
  - ~15mJ/cm2

- Today: 2 systems shipped to customers, 1st is operational
- NXE:3100 system verification
  - <5% System Flare
  - <7nm matched Overlay
  - Wafer Processing at 5wph
  - Upgrade path to 60wph Q4/11
- 22nm data from NXE:3100
  - 10mJ/cm2
- 18nm resolution shown

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Courtesy: C. Wagner, ASML, March 3, 2011

NXE:3100 Status
Flare <5%

NXE:3100 Flare is < 5% under 2μm bar

confirms lens qualification at Zeiss

ADT: E_{dtd} ~$6E_0$ → optics flare ~14%

bar: 2x10 μm²

6xEo 7xEo 8xEo 9xEo 10xEo 11xEo 12xEo 13xEo 14xEo 15xEo 16xEo 17xEo 18xEo 19xEo

NXE:3100: E_{dtd} ~$16E_0$ → optics flare ~5%

Flare (%)

ADT

NXE:3100

26mm full field

$$flare = \frac{E_0}{E_{dtd}} \times 100\% - mask\ flare$$

$$mask\ flare = \frac{R_{abs}}{R_{multi}} \times 100\%$$

imec

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Courtesy: C. Wagner, ASML, March 3, 2011

NXE:3100 Status
Throughput 20x Improved (over ADT)

NXE:3100 >20x productivity than ADT

10x short to meet 60wph, upgrade path in place

Productivity [wph]

100

10

1

0.1

Progress result of source, optics and scanner

ADT

NXE:3100 today

NXE:3100 goal

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Both Cymer and Ushio sources shipped to customers

Reference conditions: 125 fields, 16x32mm, 10mJ/cm2

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Courtesy: C. Wagner, ASML, March 3, 2011

Cymer LPP Source:
11 W Exposure Power

4 Cymer LPP sources integrated to NXE:3100

11W expose power being implemented at scanner

>99% Fields

<0.2% Dose

Good Die (%)

Dose Repeatability (%)

Demonstration

80W expose power at 3% duty cycle

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CYMER

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Courtesy: C. Wagner, ASML, March 3, 2011

Xtreme DPP Source:
12 W Exposure Power

1st Ushio source integrated and exposing wafers

9 shell collector, 7W integrated, 12W (61W, 20%) demonstrated

power at plasma [W/2pi]

1600
1200
800
400
0

0 20 40 60 80

input power [kW]

+/- 0.2% dose control

30min

61W expose power
at 20% duty cycle

XTREME technologies

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Courtesy: C. Wagner, ASML, March 3, 2011

Xtreme DPP Source:
Roadmap

NXE 3100 Field Upgrade Plan By Module Swaps

Module upgrade plan

- 3 x in RepRate
- 1.6x in identified modules improvement

First 2x demonstrated

timing	ADT	shipped	early Q2	end Q2	end Q3

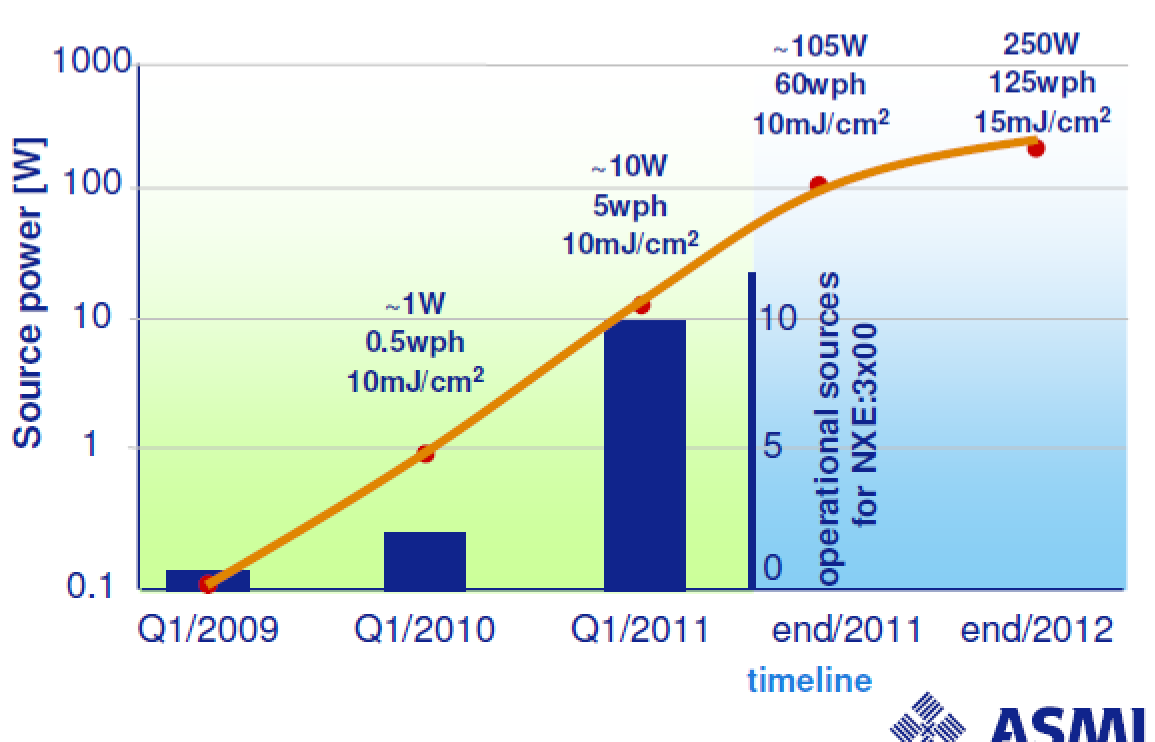
throughput [WPH] (0.1, 1, 10, 100); 20x, 2x, 5x

far-field power [W] (0, 5, 10, 15, 20) vs input power [kW] (0, 5, 10, 15, 20, 25, 30); continuous 100% duty cycle

XTREME technologies Presentation at SPIE Adv.Litho Conf. March 3rd, 2011 USHIO GROUP

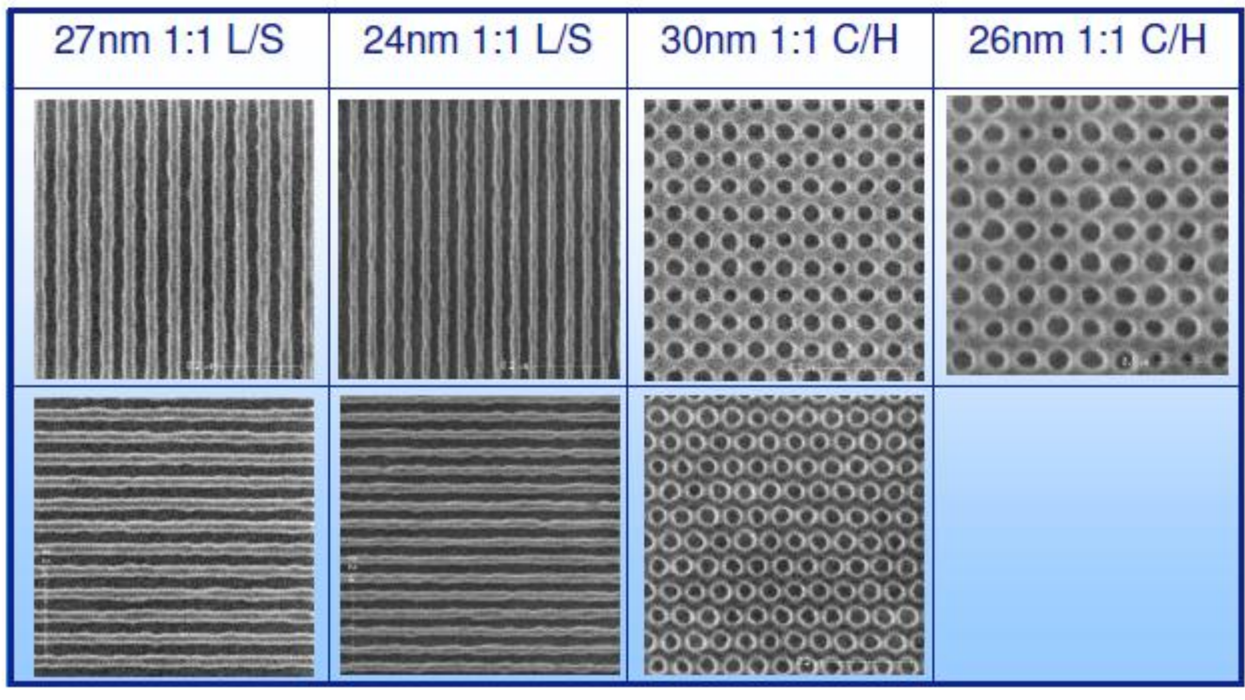
Courtesy: M. Corthout, Xtreme, March 3, 2011

Source Power & Throughput Roadmap



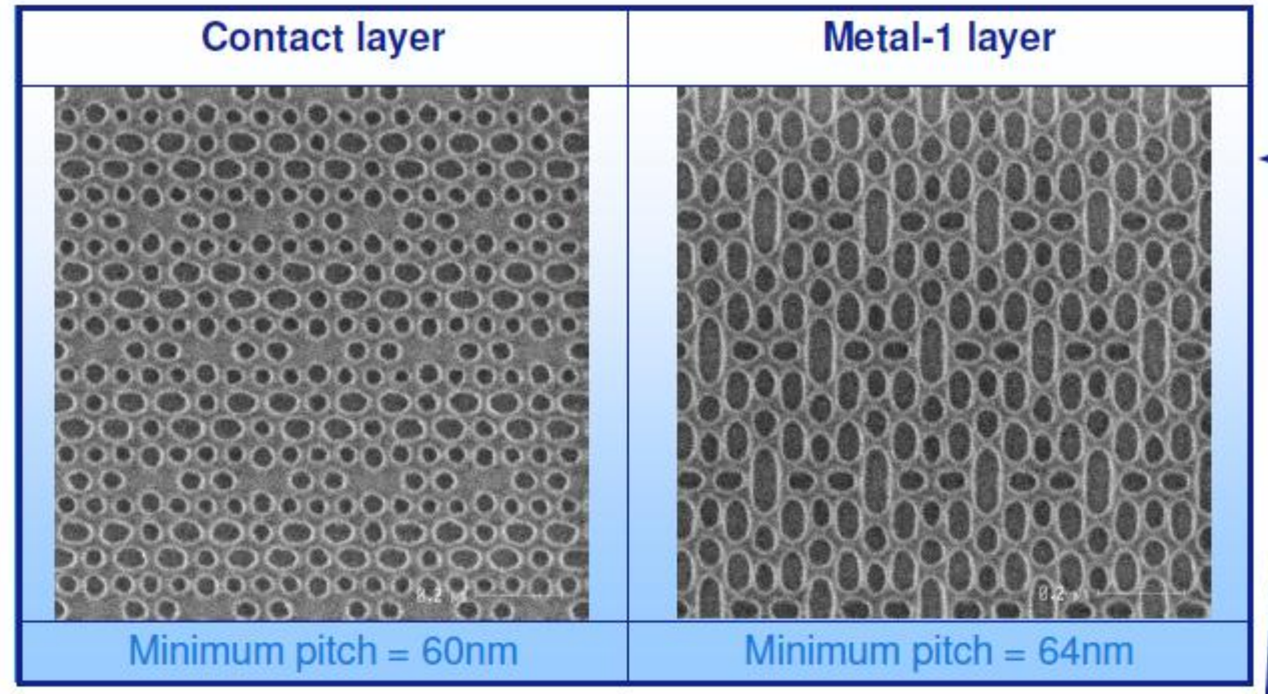
Courtesy: C. Wagner, ASML, March 3, 2011

NXE:3100 Status
Resolution -24 nm L/S ; 26 nm CH



Courtesy: C. Wagner, ASML, March 3, 2011

NXE:3100
Resolution- 14 nm node SRAM CH resolved

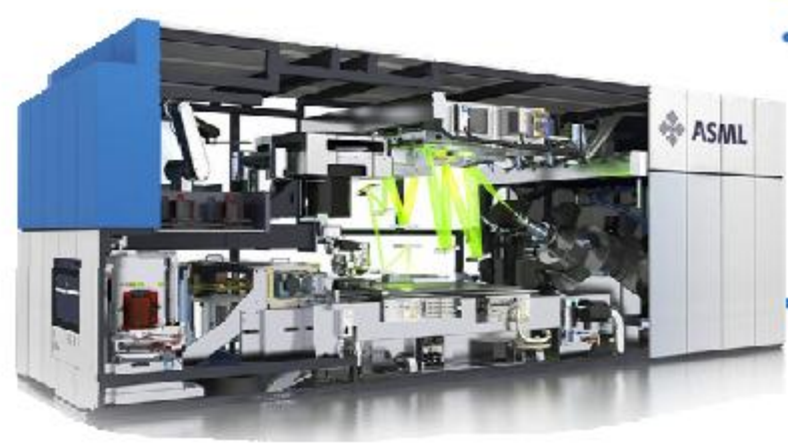


Courtesy: C. Wagner, ASML, March 3, 2011

HVM Level EUVL Scanner Specifications

NXE:3300B 1st shipment: H1 2012

2nd generation of NXE platform, NA raised to 0.33NA



Specifications

- Imaging
  - NA = 0.33
  - σ=0.2-0.9 / OAI
  - Resolution 22 nm
    18/16nm with OAI
- Overlay
  - DCO 3.0nm
  - MMO 5.0nm
- Productivity
  - 125 wph
    15 mJ/cm^2 resist

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Courtesy: C. Wagner, ASML, March 3, 2011