

EUV Source Workshop

Workshop Summary

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Accelerating the next technology revolution.

Presentation outline

- EUV Source Workshop Highlights
- List of Top EUV Source Technical Challenges
- Acknowledgements and Announcements



EUV Source Workshop Highlights

- **Cymer**
 - **Sn GDPP** power Source/IF : 700 W/ **60 W**
 - **Li LPP** HVM option (3% CE, **4 W @ IF** demonstrated)
- **EUVA**
 - **Xe LPP** power :Source/IF : 9.1 W/ **4 W**, **100 Million collector lifetime**
 - Laser: 1.5 k W, 10 K Hz (6 ns), 1064 nm; Evaluating CO2 laser
 - **Xe GDPP** power :Source/IF 59.3 /**8.4 W**; 7 K Hz, **>10 M lifetime**
- **EXULITE**
 - Focus on laser development: Diode pumped Nd:YAG oscillator, 1000 W with two 500 W modules, 37 ns, 6-20 k Hz.
 - Design for grazing angle pi sr collector.
- **PLEX LLC**
 - **Xe GDPP**: 100 W / **5 W**. **600 Million electrode lifetime** at 5 J /Pulse



EUV Source Workshop Highlights ..continued

- **Philips Extreme**
 - **Sn GDPP** power: Source/IF **257 W / 50 W (pi sr) (Pulse)**
 - **>300 Millions of electrode lifetime**
 - **Collector lifetime 2- 3 Billion (Xe), 100 M shots (Sn)**
- **PowerLase**
 - **Xe LPP** power : Source/IF : **7 W / 3 W**
 - **1.0 k W, < 9 ns, 5 K Hz. Higher efficiency (18%) and smaller footprint (5x reduction expected compared to present systems)**
 - **2% CE for Sn LPP demonstrated**
- **Xtreme technologies**
 - **Xe GDPP** power: Source/IF **200 W/ 25 W**
 - **Electrode > 300 Million lifetime, collector lifetime 1 B (280 hours)**
 - **Sn GDPP** power: Source/IF **400 W/ 50 W – 75 W (pi sr)**
 - **Collector lifetime 5 Million**
 - **Xe LPP** power: Source/IF **7 W/ 2.3 W,**
 - **Nozzle life time > 1.5 Million, collector life time 5 B (7 W, 5 k H z , 280 Hours), Expect delivery of pi collector**
 - **1.2 k W laser, droplet target**



List of EUV Source Technical Challenges

1. Collector lifetime and Debris Mitigation [106 (63)]
2. Cost of ownership [64]
3. Thermal loading of collectors [44]
4. Source power [39]
5. Spectral Purity [27]
6. Higher efficiency collector designs [19]
7. Non-collector critical component lifetime [12]
8. IF Metrology readiness [11]
9. Conversion efficiency [11]
10. Laser related issues [6]
11. Standards for comparison of lifetime [5]

(Debris mitigation was formerly 4th but combined with Collector lifetime)



Acknowledgements and Announcements

- Thanks to Presenters, Session Chairs, Chairpersons, Panel Discussion Co-chairs, EUV Source Workshop Organization Committee, SEMATECH meeting services, Japanese Meeting Service Tech Team and Darlyne Harlan, and Connie Reed
- Next EUV Source Workshop will be held on Sunday before SPIE (February 27, 2005) in San Jose, California, USA.
 - Source workshop will have a poster session after the workshop.

