EUV ERC Overview: Compact Coherent EUV Sources

Tabletop EUV Lasers

- High Average Brightness
- High Pulse Energy
- \( \lambda = 10 \text{ – } 47 \text{nm} \)
- ps to ns pulses
- Installed in the U.S. and Europe

High Harmonic Sources

- High Average Brightness
- High Rep Rate (1 – 100kHz)
- \( \lambda = 3 \text{ – } 30 \text{nm} \)
- femtosecond pulses
- In use worldwide

KMLabs XUUS system

Milliwatt average power at 47nm

20 microwatt at 13.9nm
EUV ERC Overview: EUV Lithography Metrology

with Synchrotron Light

- High resolution EUV printing with high sensitivity and low LER
- Chemical analysis of exposed EUV photoresist
- Characterization of native defects on a full field mask
- Measurement of mask – LWR, LER
EUV ERC Overview: EUV Lithography Metrology with Compact Coherent Sources

EUV Laser based AIMS Tool

Potential collaborations with large semiconductor manufacturer in Inspection and Metrology

Mirror with a defect.
Move normal to the beam

Spatial resolution CD=55 nm
Image capture time: 5-90 sec
EUV ERC Overview: Nanoimaging

Compact Broad area EUV Microscopes

Compact Microscopes based on Lenseless Imaging

Imaging of magnetic spin dynamics with Synchrotron Light
EUV ERC Overview: Nanoscale Patterning

EUV Interferometric Lithography

Step 1: Laser beam on PMMA coated Si sample
Step 2: Laser beam on Cr coated glass substrate - mirror

Talbot Printing

Talbot Mask
1st Talbot Plane
2nd Talbot Plane
3rd Talbot Plane
EUV ERC Overview: Nanoscale Materials Metrology

Characterizing heat flow at the nanoscale

Acoustic metrology of thin films

EUV Laser ablation analytic nano-probes

Element specific dynamics of magnetic nanostructures

Soft X-Rays from high harmonic light sources
EUV ERC Overview: EUV Based Spectroscopies

Understanding charge transfer on catalytic surfaces, photovoltaics

K-edge spectroscopy of HSQ photoresist

Controlling reactions at the level of electrons

Single-photon ionization mass spectrometry of EUV optics contaminants
## Membership Levels

<table>
<thead>
<tr>
<th>Membership Level</th>
<th>Annual Support Amount</th>
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</thead>
<tbody>
<tr>
<td>Principal Corporate Member</td>
<td>$50,000 cash support</td>
</tr>
<tr>
<td>Corporate Member</td>
<td>$25,000 cash support or $50,000 cash equivalent</td>
</tr>
<tr>
<td>Associate Corporate Member</td>
<td>$10,000 cash support or $20,000 cash equivalent</td>
</tr>
<tr>
<td>Small Business Corporate Member</td>
<td>$5,000 support with at least $2,500 in cash</td>
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</tbody>
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Membership Benefits

• Nearly 100:1 Leverage of R&D investment: other funding from NSF, universities, state government
• Center research guidance through IAB Membership
• Access to highly capable, industry-ready students continuously graduating from the ERC
• Preferential access to personnel and facilities
• Licensing opportunities for EUV Intellectual Property
• Priority access to research results and reports
• Neutral forum for industry-wide interactions