EUVL Activities in China

Yanqiu Li
Beijing Institute of Technology (BIT)
Phone/Fax: 010-68918443
Email: liyanqiu@bit.edu.cn

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Refer to the published information.

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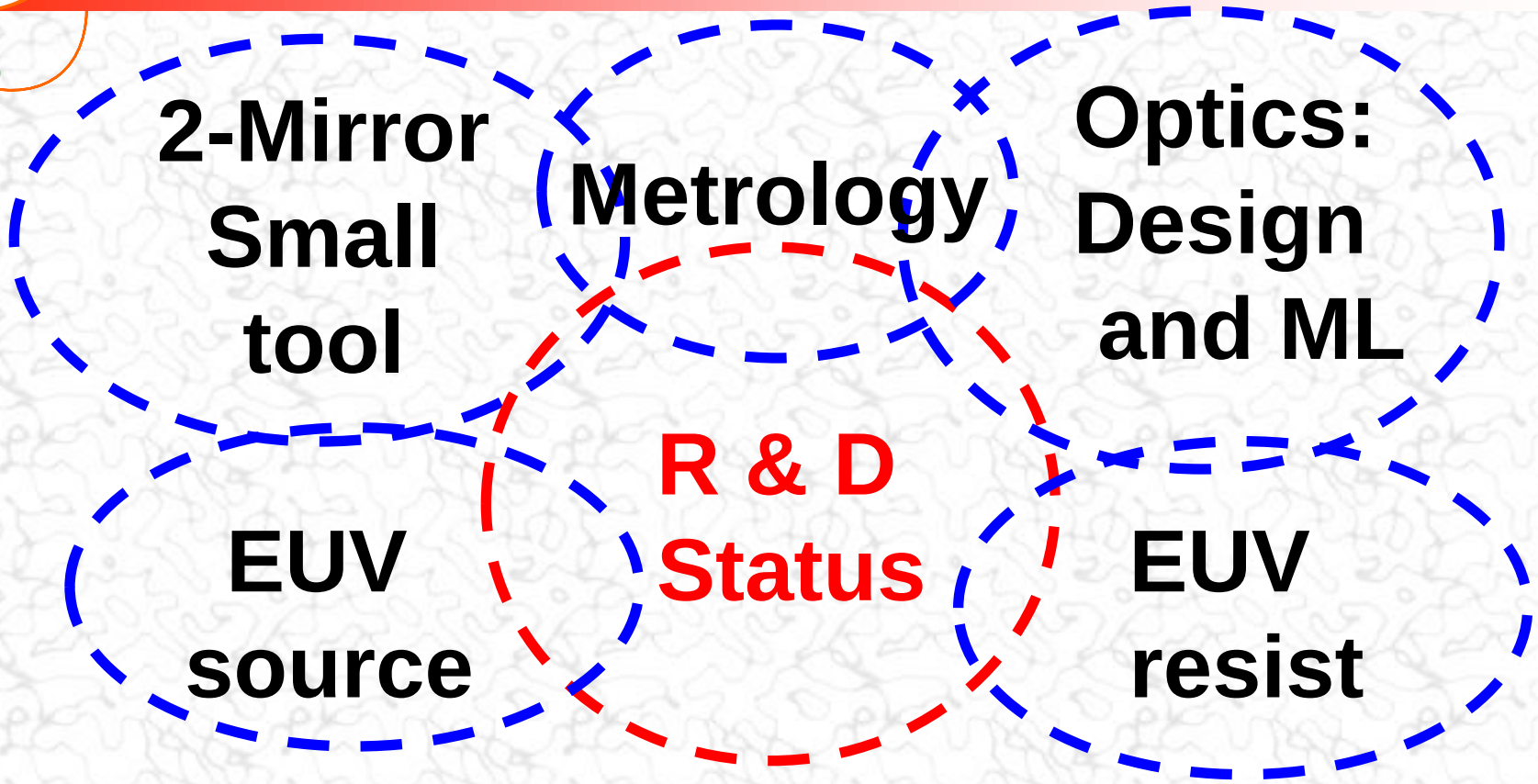
National Research Foundation Shown in this presentation

- **NSFC:** National Natural Science Foundation of China.
- **NBRFC:** National Basic Research Program of China.
- **NSTMP:** National Science and Technology Major Project.
- **MOE:** Ministry of Education

Overview



Activities in Chinese Academy of Sciences and some Universities.

Supported by Government.

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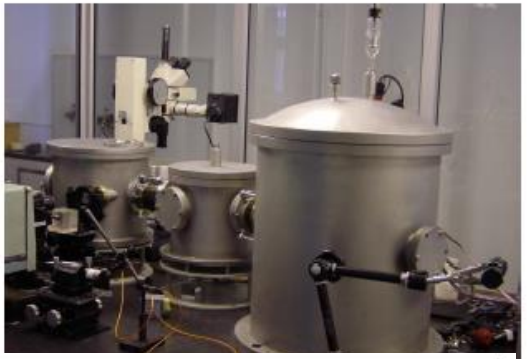
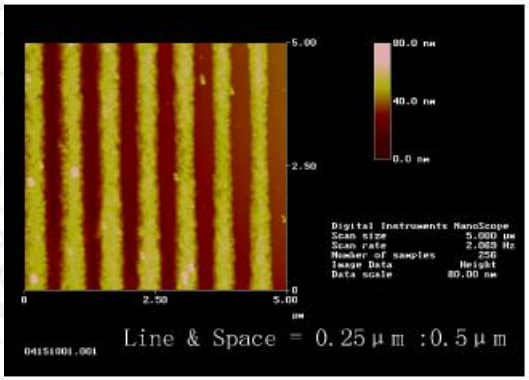
System





2-Mirror system
NA0.1, LPP source.

Resist pattern: 250nm.

In Changcun Institute of Optics, Fine Mechanics and Physics (CIOMP) of CAS.

Supported by NSFC.

Ref. Proc. SPIE 6724 (2007).

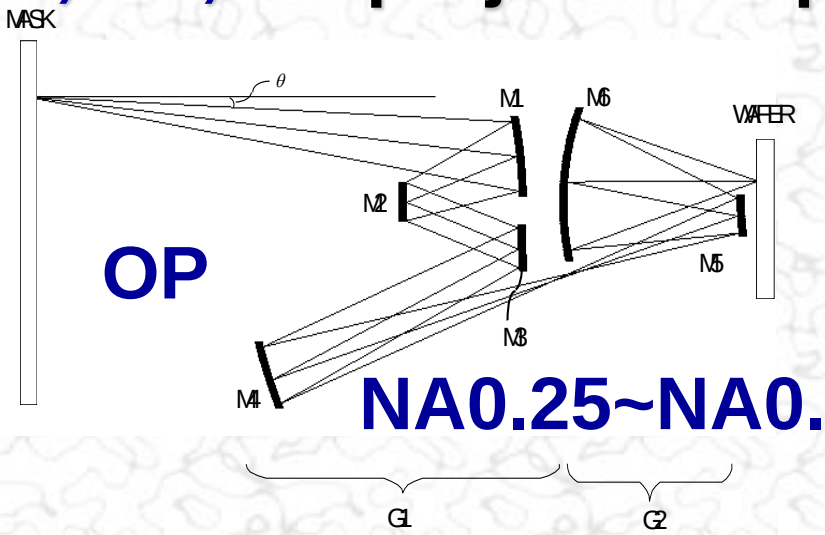
EUVL Optics

1. EUVL Optical Design

4M, 6M, 8M projection optics

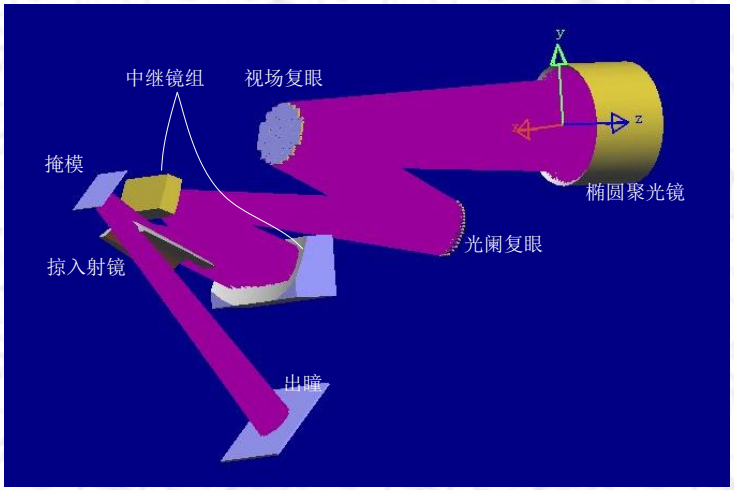
Field: 26mmx1.5mm

Illumination (OAI, CI)



OP

NA0.25~NA0.33



Activities in Beijing Institute of Technology (BIT)

Supported by NSTMP & MOE.

Ref. Proc. SPIE 8679(2013), Opt. Rev.20, (2013), EUVL workshop 2013

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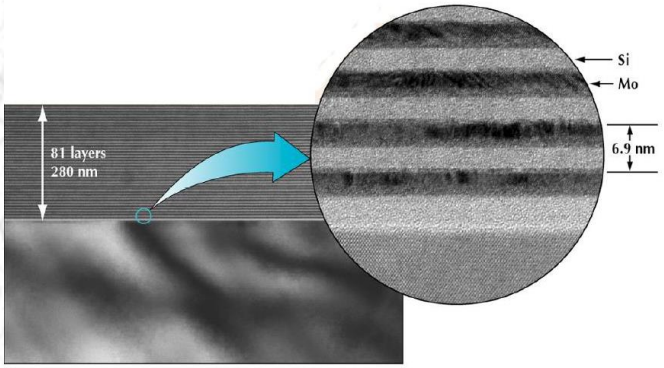
EUVL Optics

2. Mo/Si- ML coating

Reflectivity 65%,

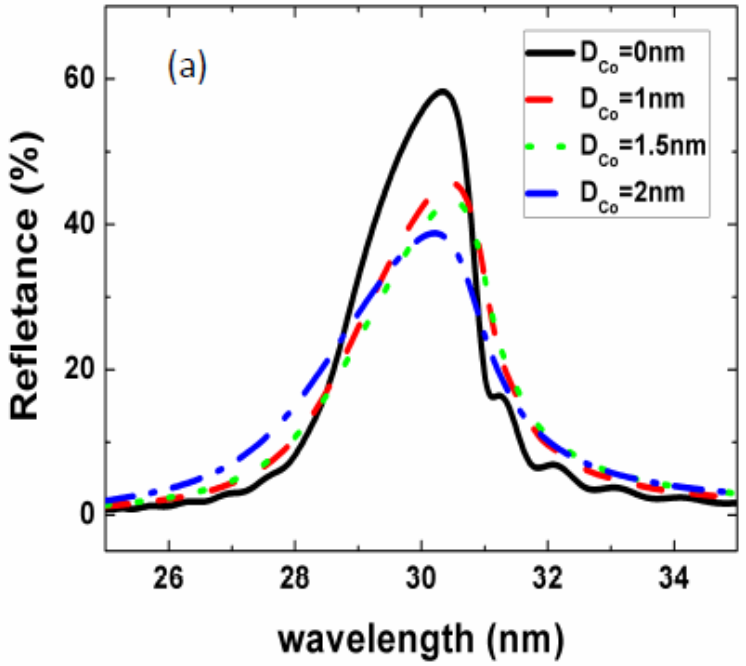


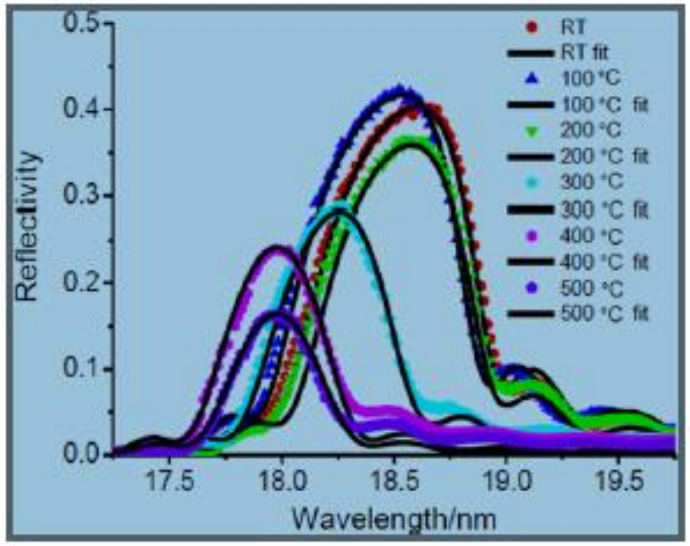
Activities in CIOMP (CAS)

Ref. ACTA Optic SINICA,2002,2008. Optics and Precision Engineering, 16 (2008)

EUVL Optics

3. Co/Mg/Co/B_4C & Al(Si)/Zr ML coating





Al(Si)/Zr

Activities in Tongji Univ., but not for EUVL.

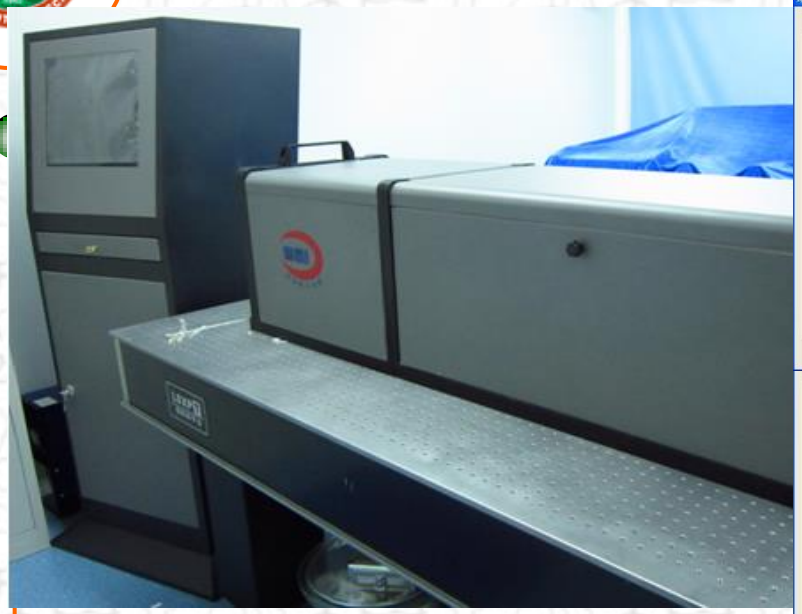
Supported by NBRPC, NSFC, Sci. & Tech Cooperation project of China and Japan.

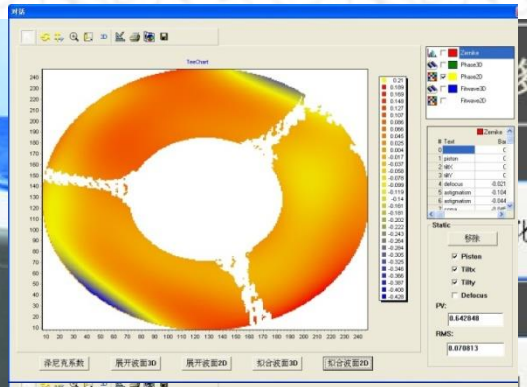
ref. SPIE 7995 (2011), Appl Phys A 109 (2012)

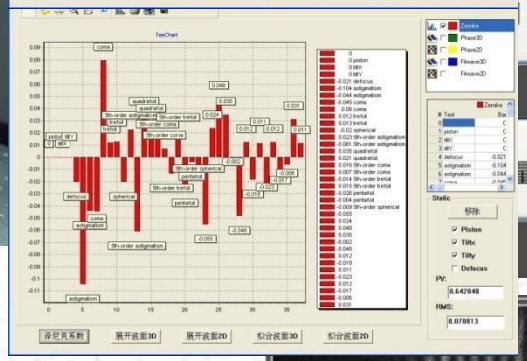
Metrology in BIT

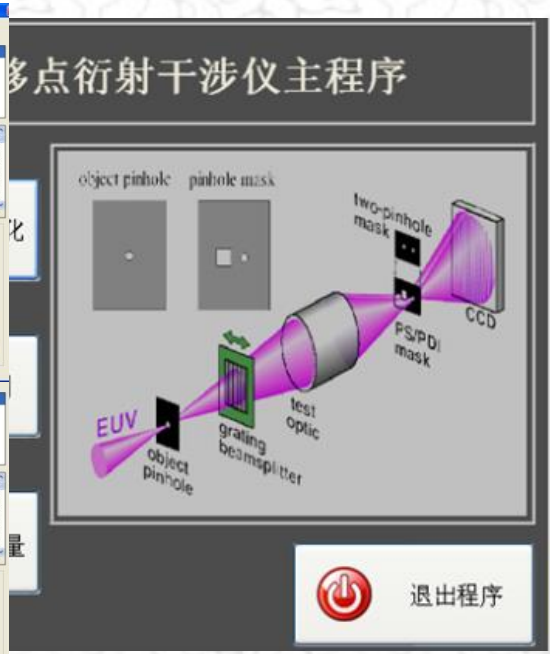
Supported by NSTMP, NSFC, MOE.

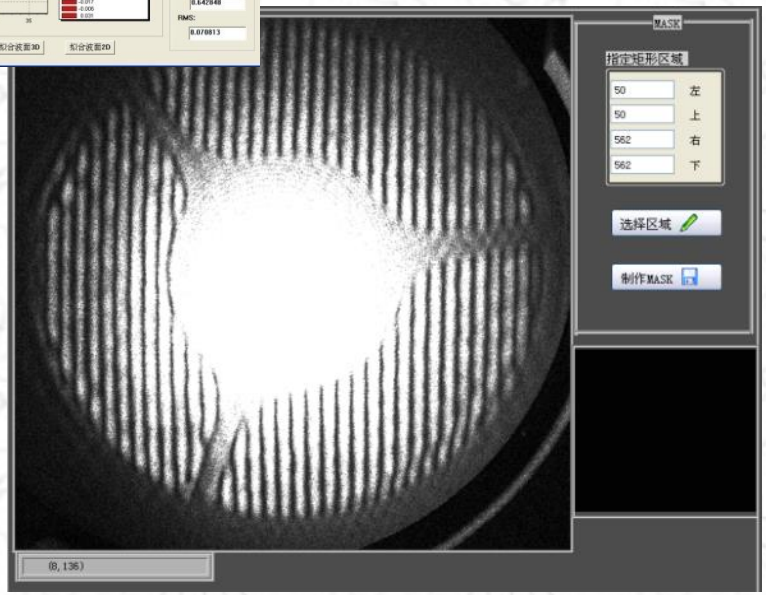
PS/PDI at 632.8nm wavelength (BIT)











Absolute measurement accuracy: 5 nm rms.

Measurement repeatability: 0.55 nm rms.

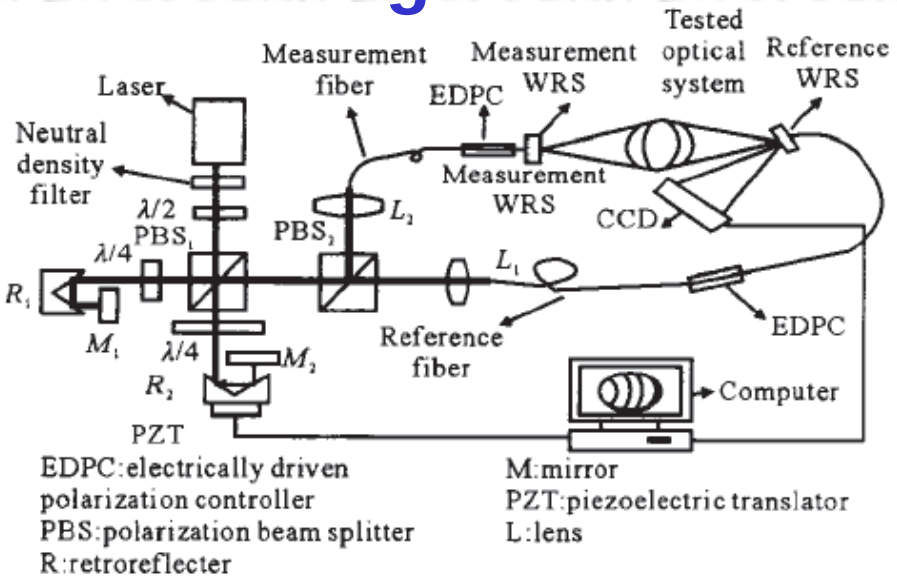
Measurement Speed:20s/field point.

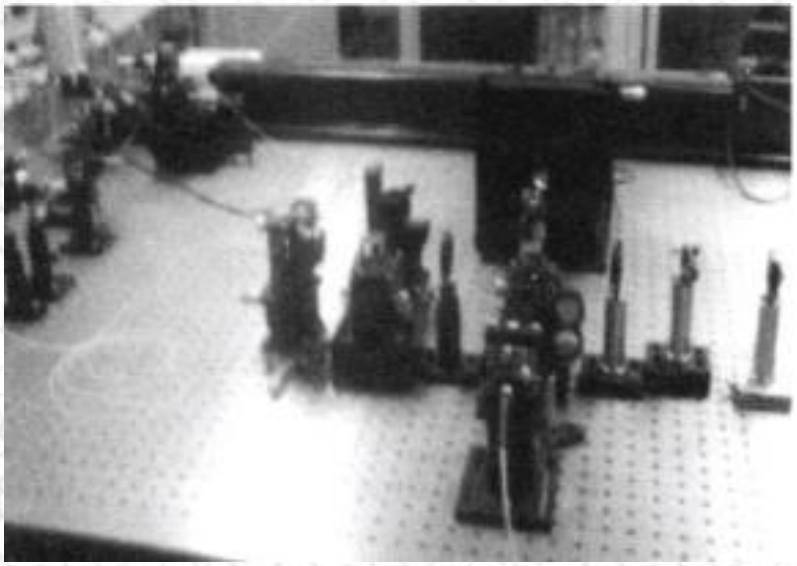
ref. Rev. Sci. Inst. (82) 2011.

Metrology in CIOMP

PS/PID, measurement repeatability: 0.31nm rms

Visible light





Ref. Infrared and Laser Engineering, Chinese Journal of Lasers, 28(2011).

EUV Source

1. In Shanghai Inst. of Opt. & Fine Mech. (SIOM)

"Experimental study on extreme ultraviolet light generation from high power laser-irradiated tin slab*"

Supported by the Opt. Sci. and Tech. Program , Shanghai.
Ref. ACTA PHYSICA SINICA (in Chinese), 8(2008).

2. In Harbin Institute of Technology

"Experimental study on main pulse power supply for dicharge produced plasma extreme ultraviolet source".

Ref. HIGH POWER LASER AND PARTICL E BEAMS, 2 (2010).

Source: very basic research

3. In Huazhong Univ. of Sci. & Tech

"Research of collector mirrors of $C0_2$ laser produced plasma EUV source".

Ref. Laser Tech. (in Chinese), 34 (2010).

"Characteristics of Ion Debris from Laser Produced Tin Plasma in Ambient Gas and Magnetic Field (P11)".

Ref. EUVL workshop 2013 Hawaii.

Source: very basic research

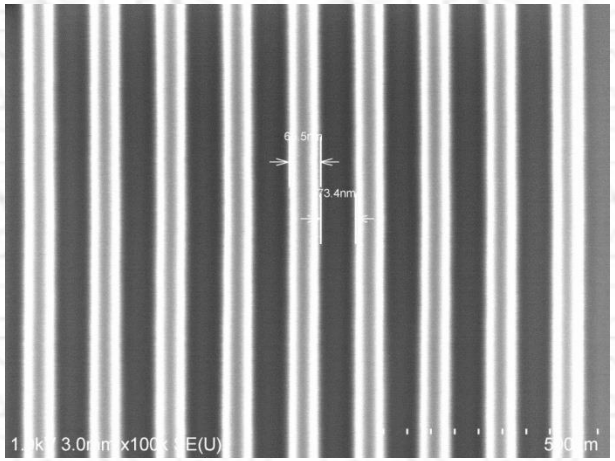
4. In Changchun University of Sci. and Tech.

"Characteristics of ion debris from laser-produced tin plasma and mitigation of energetic ions by ambient gas".

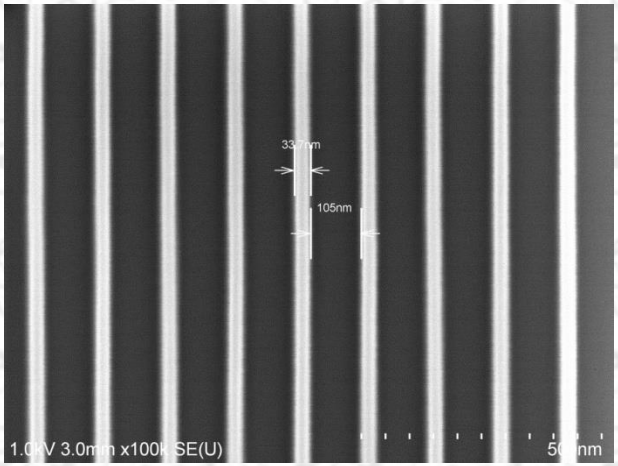
Supported by NSFC, NBRPC
Ref. SCIENCE CHINA, Phys., Mech. & Astron. 22 (2012).

EUV Resist

CD ~30-32nm



LER < 2nm

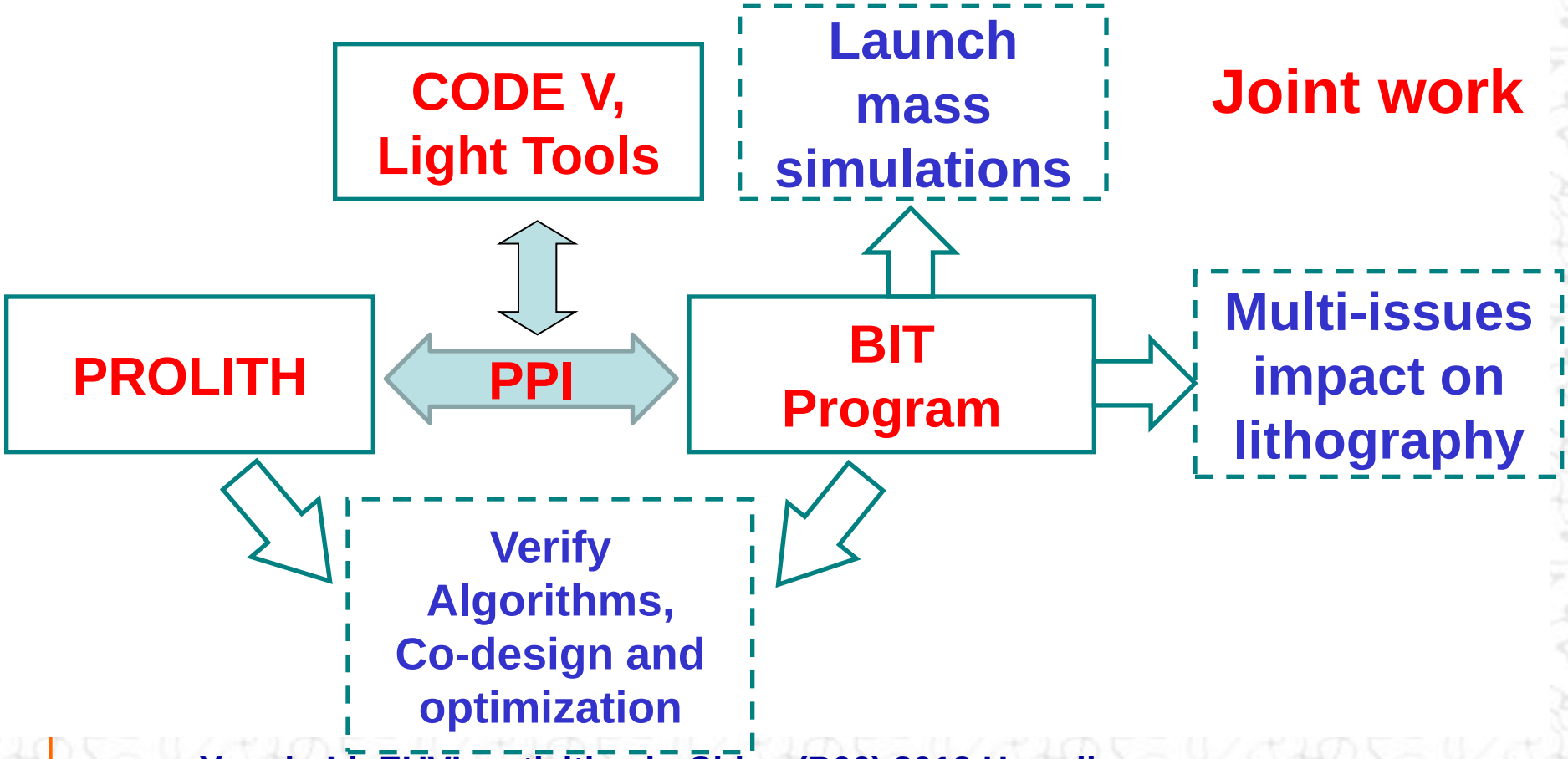


Interference pattern using Shanghai Synchrotron source

Activities in the Ins. of Chem. of CAS.
Supported by NSTMP.
Ref. Proc. SPIE 8679 (2013).

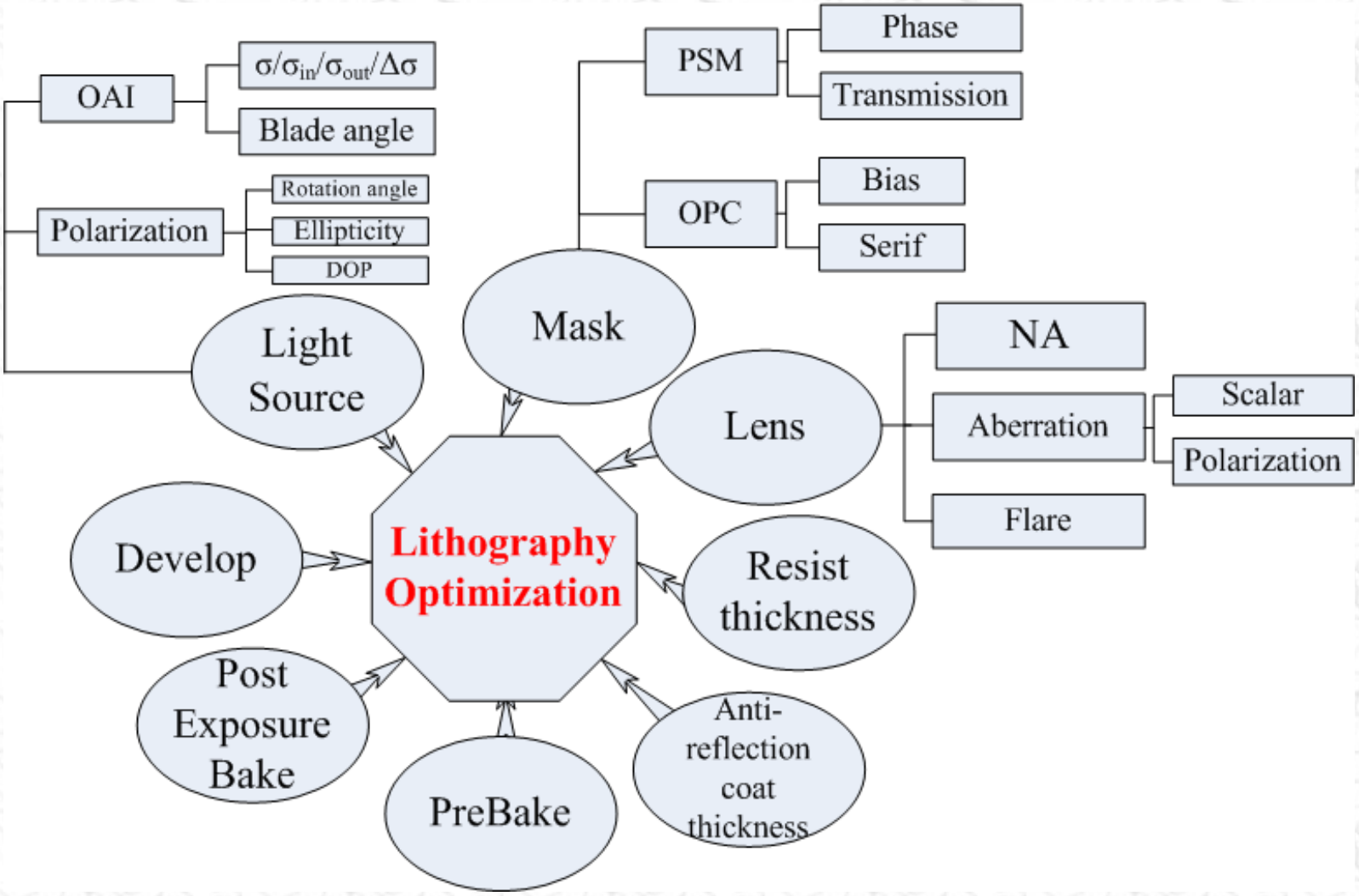
Lithography Simulation in BIT

Using PROLITH, Caliber, CODE V, Light Tools and BIT program to accomplish our activities.



BIT: Co-optimization of lithography

- **Co-optimize stepper, resist process & mask**



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More activities will be shown in the future!

Thank you very much for your attention