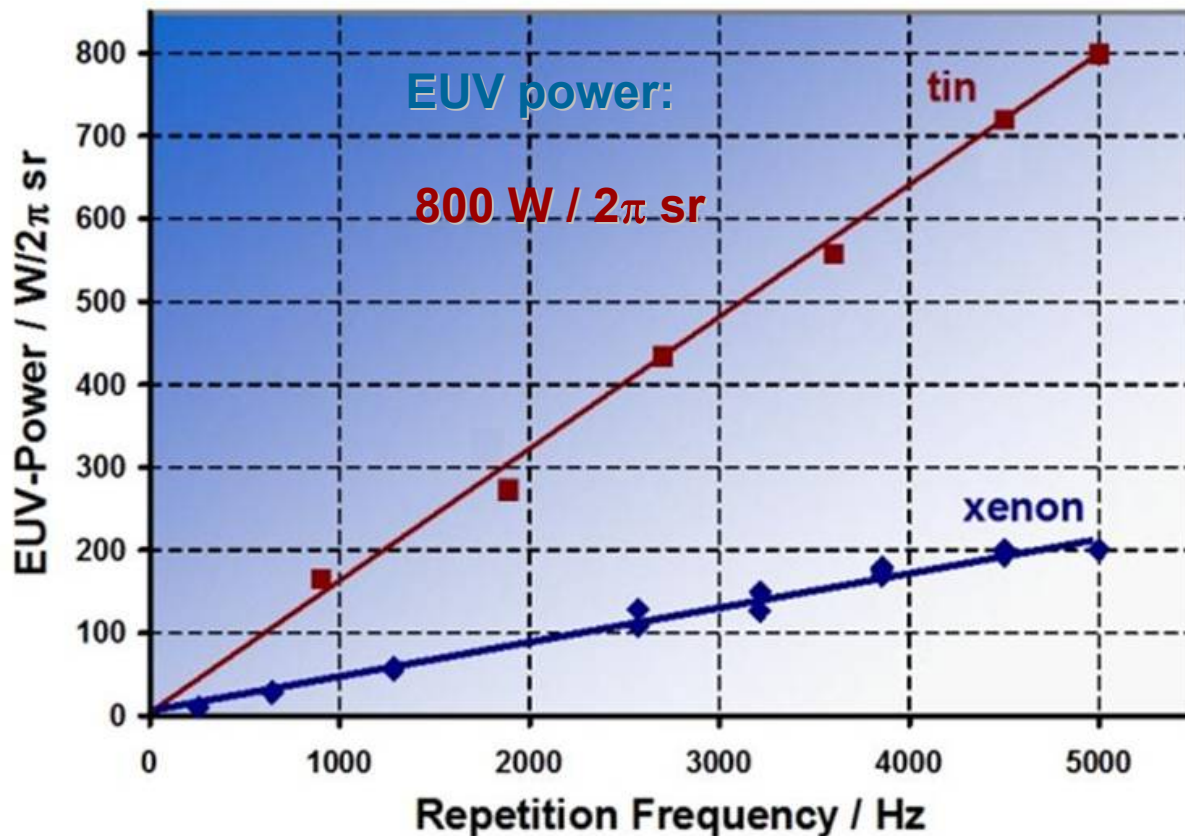

Feasibility of updated Source Requirements

Uwe Stamm

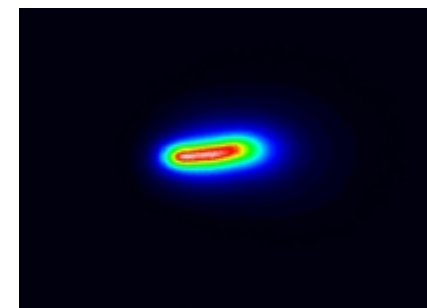
**XTREME technologies GmbH
Jena und Göttingen, Germany**

**EUV Source Workshop
November 10, 2004, San Diego, USA**

Feasibility of updated Sources Requirements



**Achievable IF power:
115 W
(1.9 sr collector mirror)**

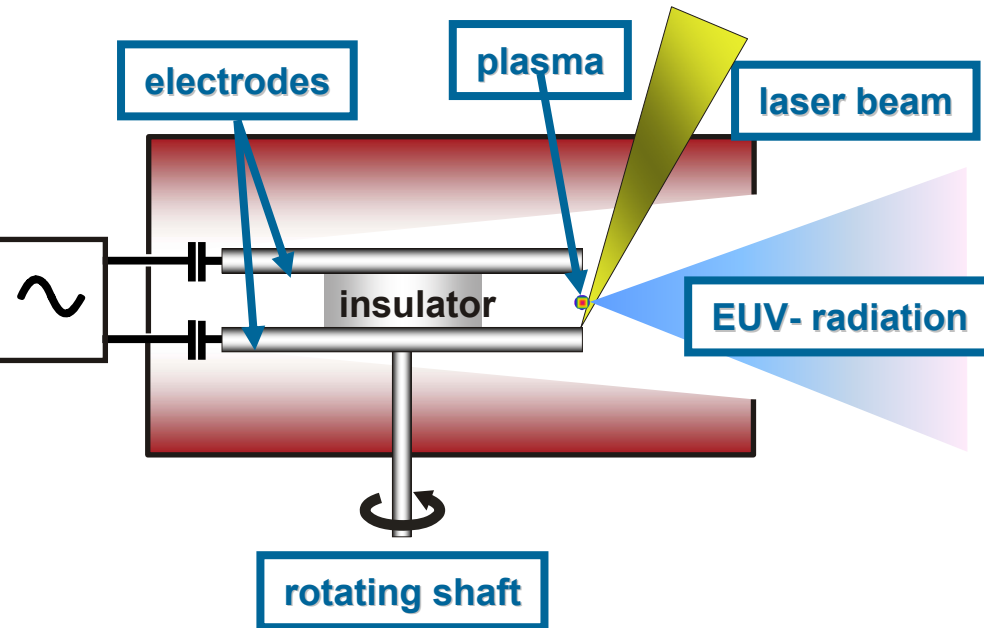


Tin Plasma Image

In principle the power requirement can be met!

GDPP Source component lifetime: Rotating disc electrode

Principle of RDE



Laboratory setup of RDE source

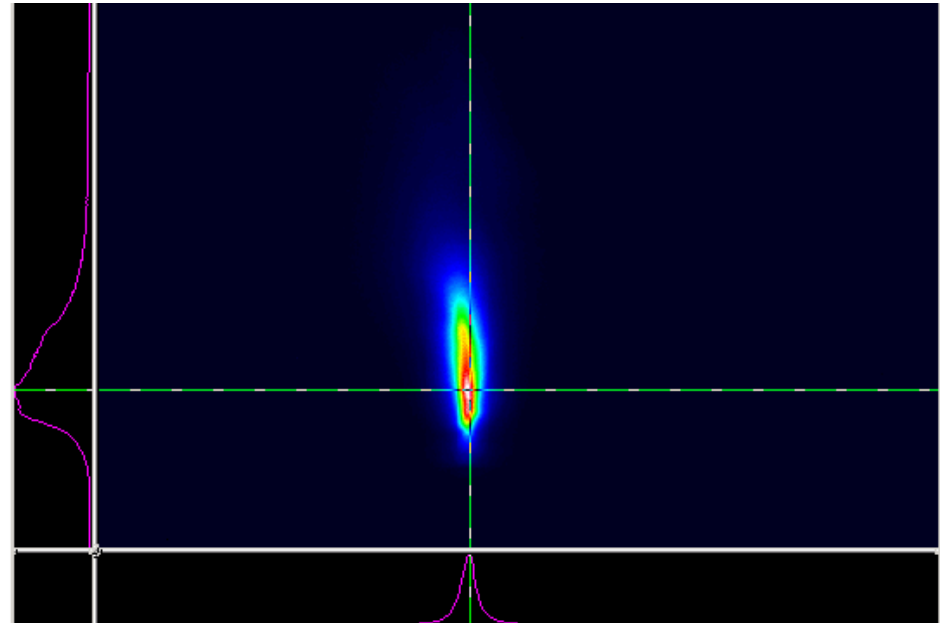
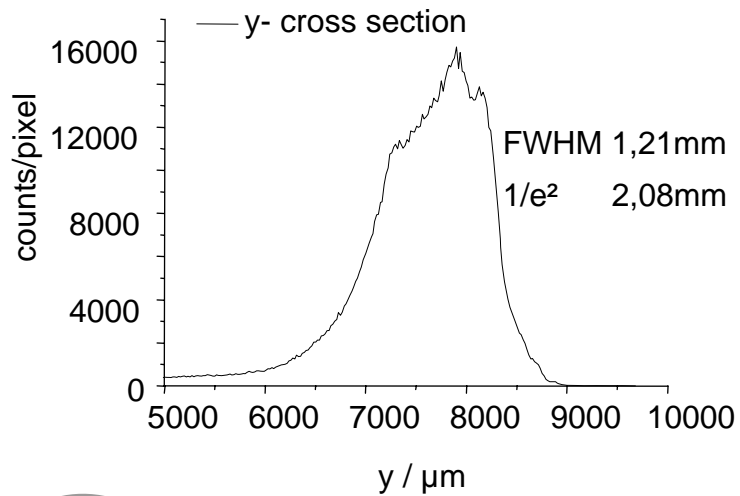
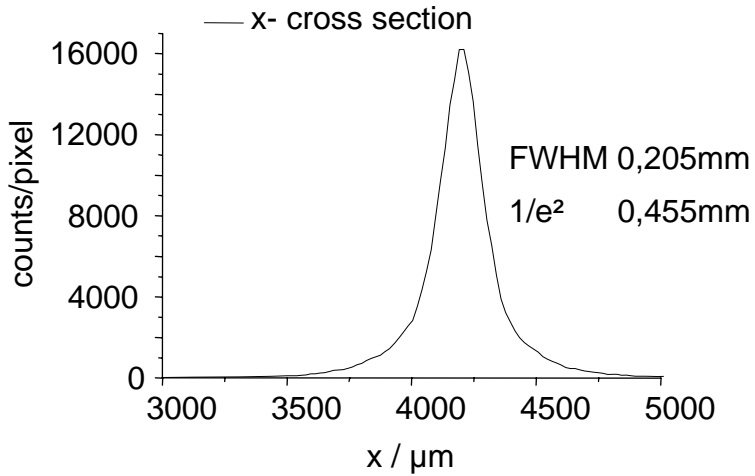


Rotating disc electrode GDPP:

- reduces heat load per cm^2
- limits the temperature rise
- will enable several 100 hours electrode lifetime

*Development in cooperation with V. M. Borisov et al.,
TRINITI, Troitsk, Russia*

GDPP Collection Efficiency



Plasma size: 1.2 mm x 0.5 mm (FW 1/e²)

GDPP Sources: HVM power estimates

Required HVM power in intermediate focus:	180 W
Gas Transmission:	85 %
Average collector reflectivity:	50 %
Etendue acceptance factor:	0.9
Collection efficiency ($\pi sr/2\pi sr$):	50 %
Transmission DMT:	80%
Required HVM power in 2π sr:	1180 W

Necessary electrical power in plasma	Xenon (CE=1%)	Tin (CE=3%)
	120kW	40kW

LPP: HVM power estimates

Required HVM power in intermediate focus: 180 W

Gas Transmission: 85 %

Average collector reflectivity: 50 %

Etendue acceptance factor: 1

Collection efficiency ($5\text{sr}/2\pi\text{sr}$): 80 %

Transmission DMT: 90%

Required HVM power in 2π sr: 600 W

Necessary driver laser power on target: Xenon (CE=1%) Tin (CE=3%)

60kW

20kW

Updated Requirements: Cost of operation

Updated required power / old power: $180 \text{ W} / 115 \text{ W} = 1.56$

Updated lifetime / old lifetime: < 0.64

Updated cost of operation: $> 1.6 \text{ x old CoO}$

Updated Requirements: Cost of operation (tin)

	cost increase				nearly equal cost			
	CE laser			CE EUV	CE collector			
LPP	10 %			3 %	30 %			
electr. power	→	laser power		→	EUV	→	IF	
		CE EUV				CE collector		
GDPP		3 %				15 %		
electr. power	→	→	→	→	→	EUV	→	IF

The updated power requirement results in much higher cost increase for LPP than for GDPP sources.