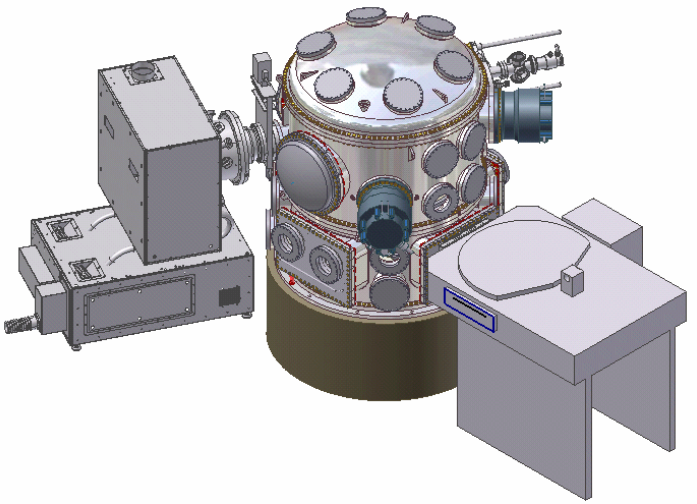
EUV Stimulated Photoresist Outgassing

BOC EDWARDS

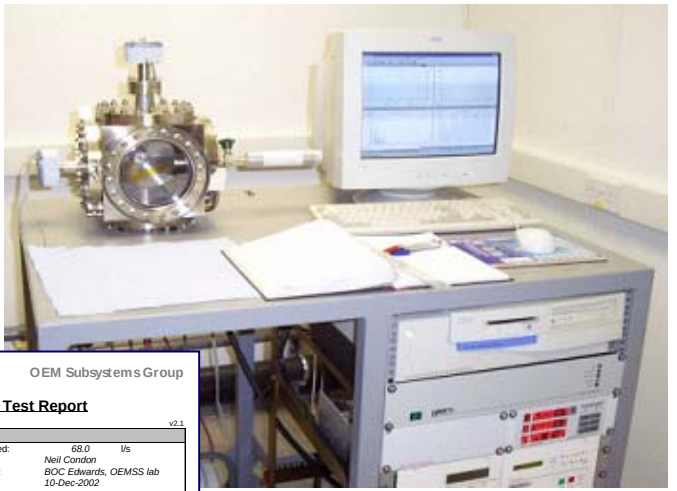
BOC Edwards Expertise for Systems Integration

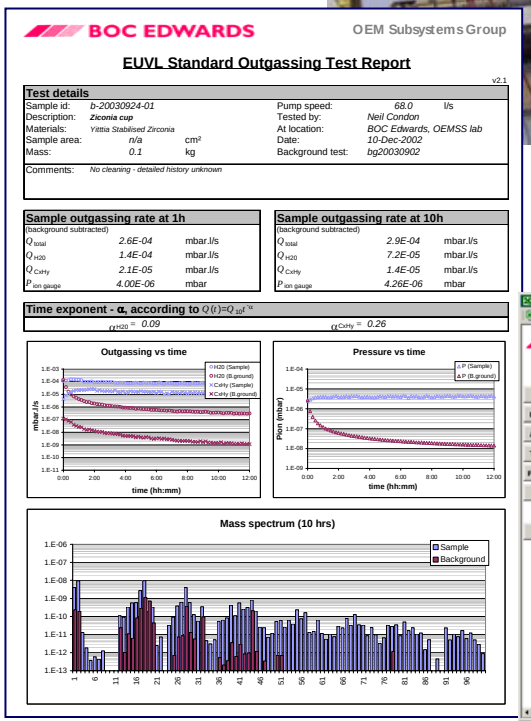
- Expertise in vacuum science, system design & engineering
- As an example, Exitech MS13.5 MET (Micro Exposure Tool) at Intel & Sematech
  - Vacuum system design and modelling
  - Vacuum materials qualification
  - Vacuum equipment specification, supply and integration
  - Vacuum control system specification, design, build, test and integration including RGAs for contamination control



EUV Materials & Component Selection

- Outgassing Measurement
  - Selection of materials/components for EUVL systems is critical to success
- BOC Edwards has fundamental understanding of the theory of outgassing
- Fully developed methods to measure outgassing
  - Standard Reporting
  - Database of Materials
- Knowledge & practical experience of pre-treatment, preparation & handling methods
- Knowledge gained from extensive sample testing > 350 samples over last 4 years
- Experience of EUV Stimulated photoresist outgassing measurement which can be applied to standardizing method





BOC EDWARDS OEM Subsystems Group

EUVL Standard Outgassing Test Report

v2.1

Test details

Sample id:	*b-20030924-01*		Pump speed:	*68.0*	l/s
Description:	***Ziconia cup***		Tested by:	*Neil Condon*	
Materials:	*Yittria Stabilised Zirconia*		At location:	*BOC Edwards, OEMSS lab*	
Sample area:	*n/a*	cm²	Date:	*10-Dec-2002*	
Mass:	*0.1*	kg	Background test:	*bg20030902*	

Comments: *No cleaning - detailed history unknown*

Sample outgassing rate at 1h (background subtracted)

Q_{total}	*2.6E-04*	mbar.l/s
Q_{H2O}	*1.4E-04*	mbar.l/s
Q_{CxHy}	*2.1E-05*	mbar.l/s
$P_{ion\ gauge}$	*4.00E-06*	mbar

Sample outgassing rate at 10h (background subtracted)

Q_{total}	*2.9E-04*	mbar.l/s
Q_{H2O}	*7.2E-05*	mbar.l/s
Q_{CxHy}	*1.4E-05*	mbar.l/s
$P_{ion\ gauge}$	*4.26E-06*	mbar

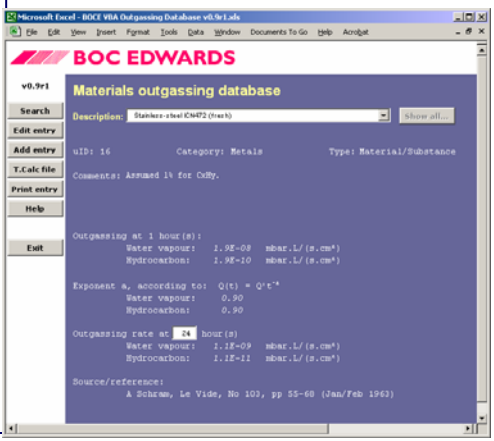
Time exponent - α, according to $Q(t)=Q_{10}t^{-\alpha}$

α_{H2O} = *0.09* α_{CxHy} = *0.26*

Outgassing vs time

Pressure vs time

Mass spectrum (10 hrs)



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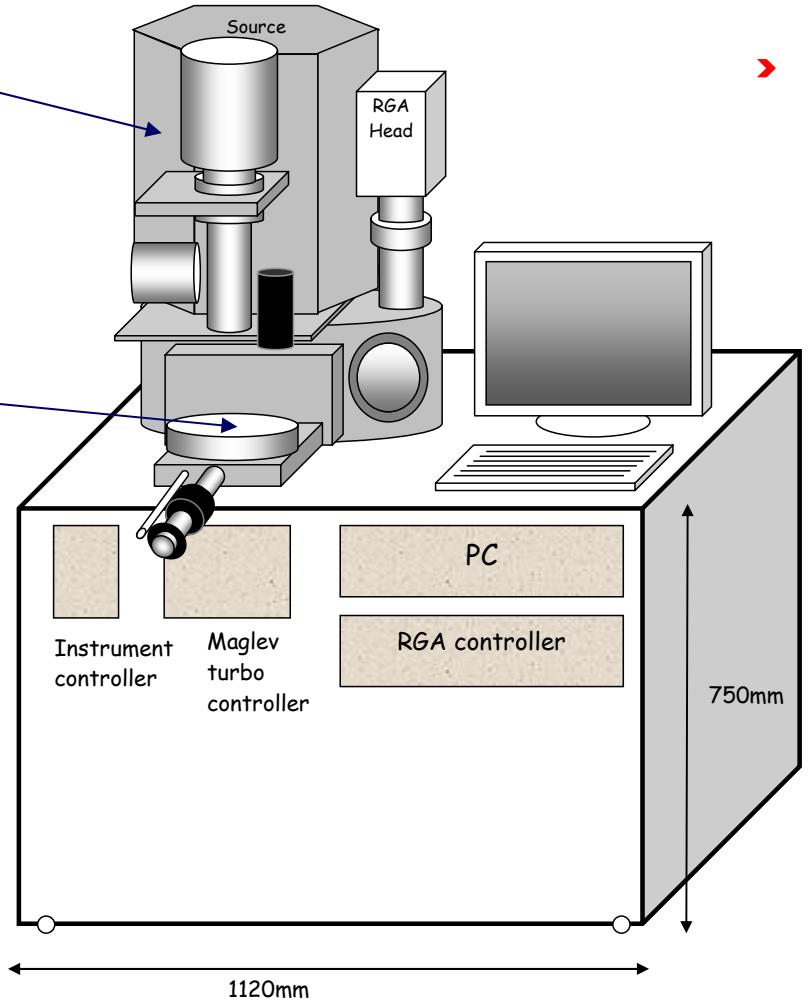
EUV Stimulated Outgassing System Concept

- Source
  - In-band
  - Broad band (SPF)
- Sample Type
  - Wafer (6”, 8”, 12”)
  - Wafer Fragment



- Level of automation?
  - Manual
  - Semi/fully automated

- Developed methodology for resist outgassing measurement