

# West Coast Junction Technology Group Recap of Ultra-Shallow Junctions Workshop

Thursday, May 22

- 1:30 - 1:40 Opening Remarks (Sue Felch)
- 1:40 - 2:10 Highlights from Monday's Process Talks (Sue Felch)
- 2:10 - 2:55 Highlights from Wednesday's and Thursday's Process Talks (Michael Current)
- 2:55 - 3:15 Break
- 3:15 - 3:45 Boxer Cross Talks (Peter Borden)
- 3:45 - 4:15 Highlights from Other Metrology Talks (Jerry Hunter)
- 4:15 - 4:30 Hg Four-Point Probe for USJs (Jim Chen, Four Dimensions)

# West Coast Junction Technology Group 2003 Schedule

- Thursday, July 17 – New Equipment
  - Thursday, Sept. 18 – What I Love and Hate about RTP Tools
  - Thursday, Nov. 20 – Characterization Techniques
- Material Analytical Services, 285 Wolfe Road, Sunnyvale
- Start at 1:30 pm

# Recent Developments and Applications of Plasma Immersion Ion Implantation

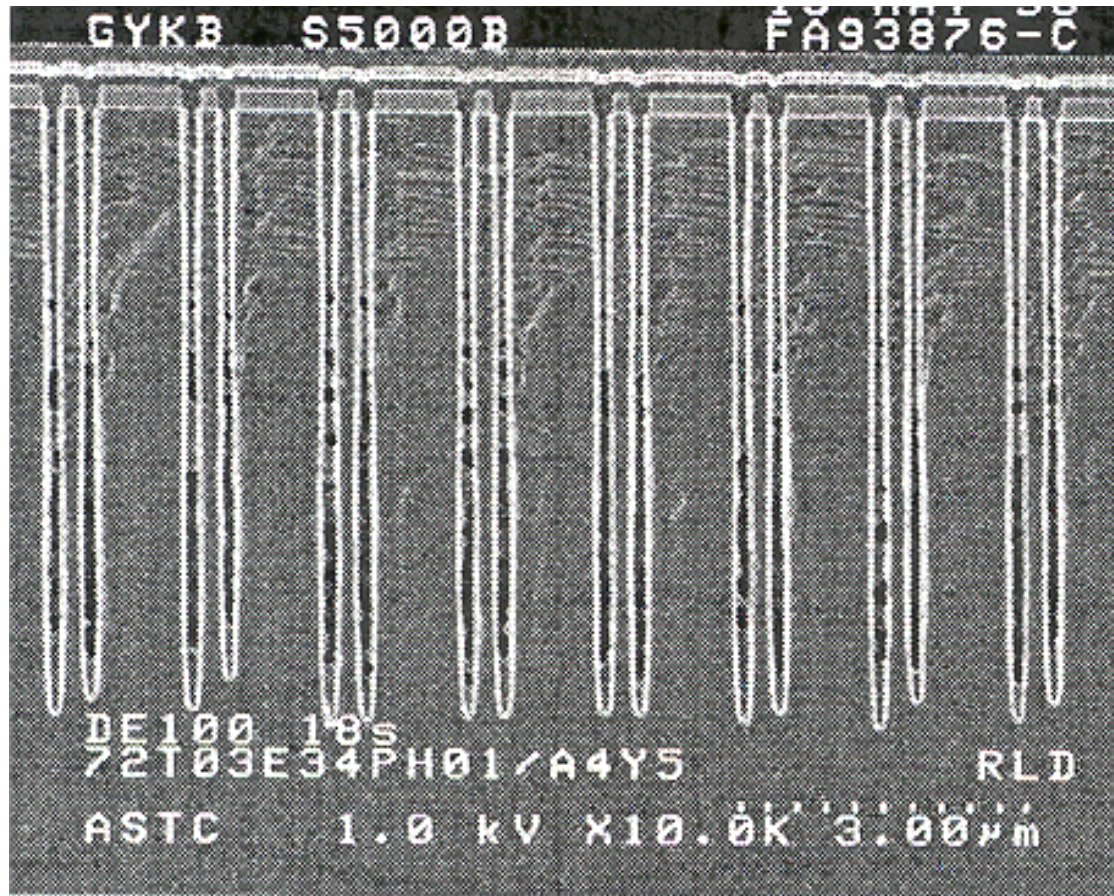
**Paul K. Chu**  
**City University of Hong Kong**

# PIII Applications & Developments

## Examples:

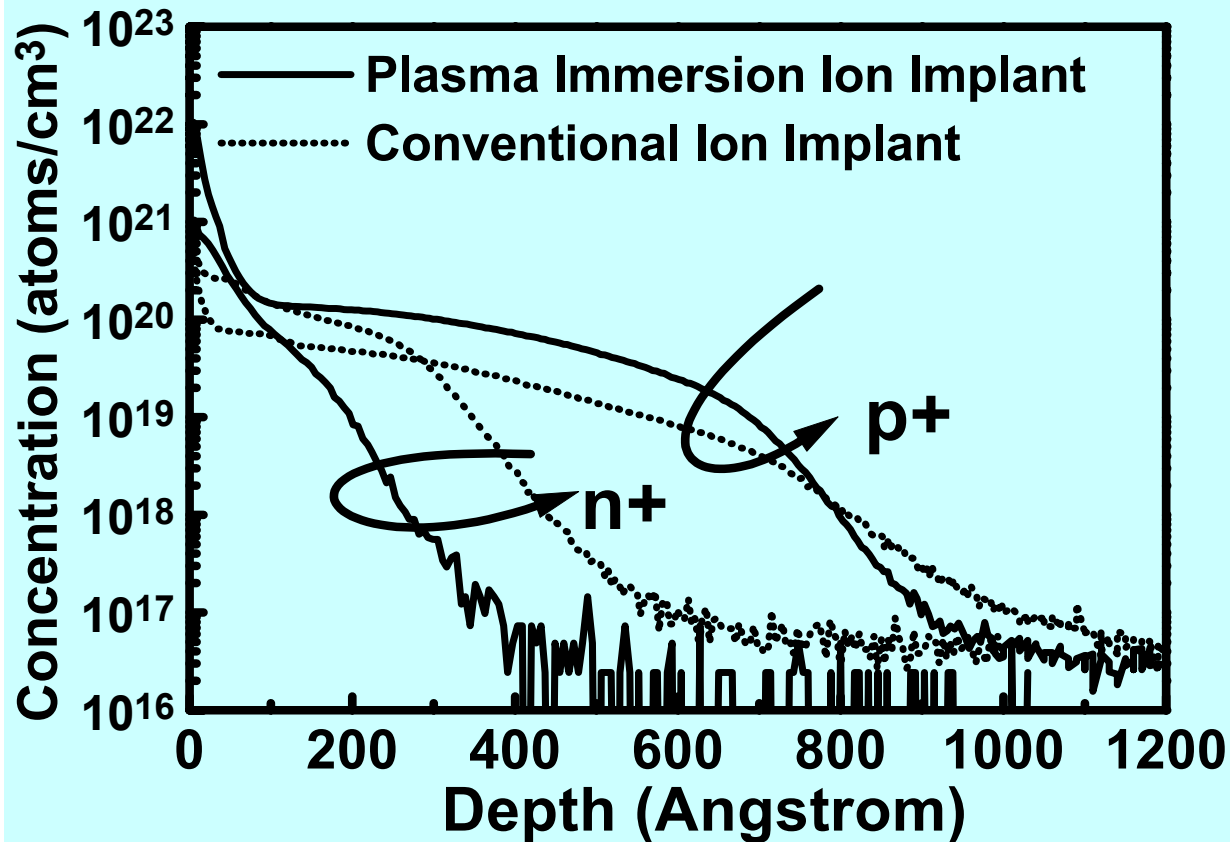
- Trench Doping
- Shallow junction formation
- Silicon-on-insulator (SOI)
- DC PIII
- Industrial and Biomedical Applications
- Insulator PIII

# SEM of PIII doped 6 $\mu\text{m}$ trench with top opening of 0.175 $\mu\text{m}$ (35:1 aspect ratio)

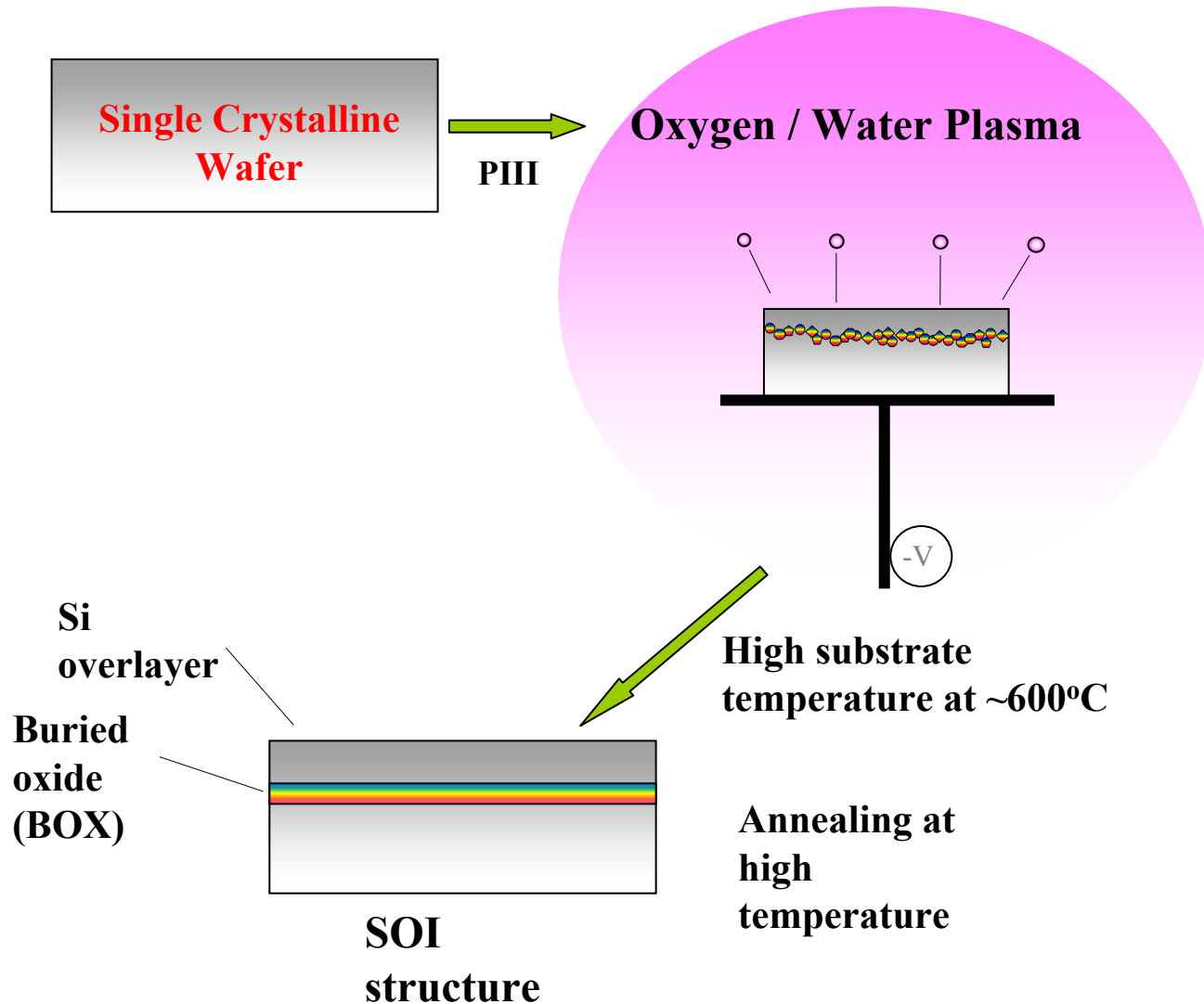


*K. Lee, Ext. Abst. Int. Workshop on Junction Technol., Tokyo, Japan, 21 (2001)*

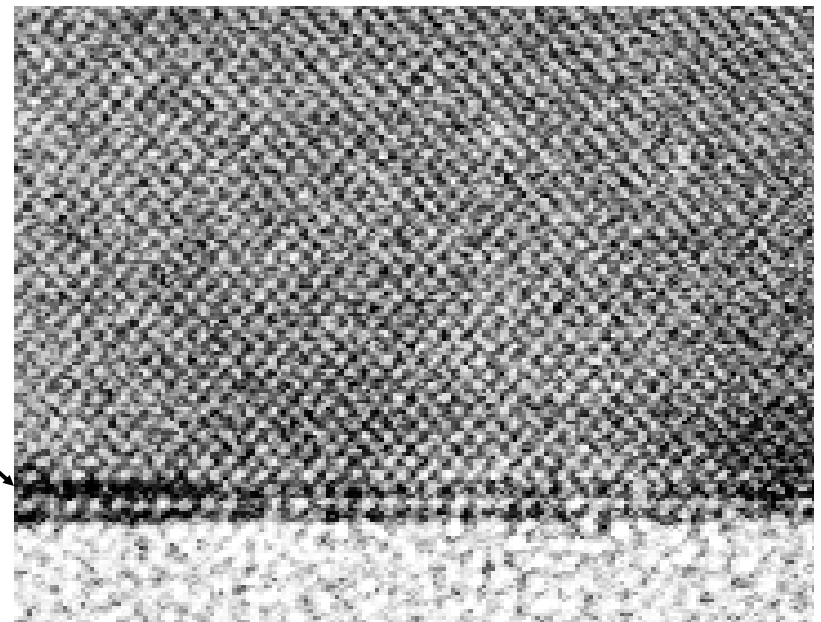
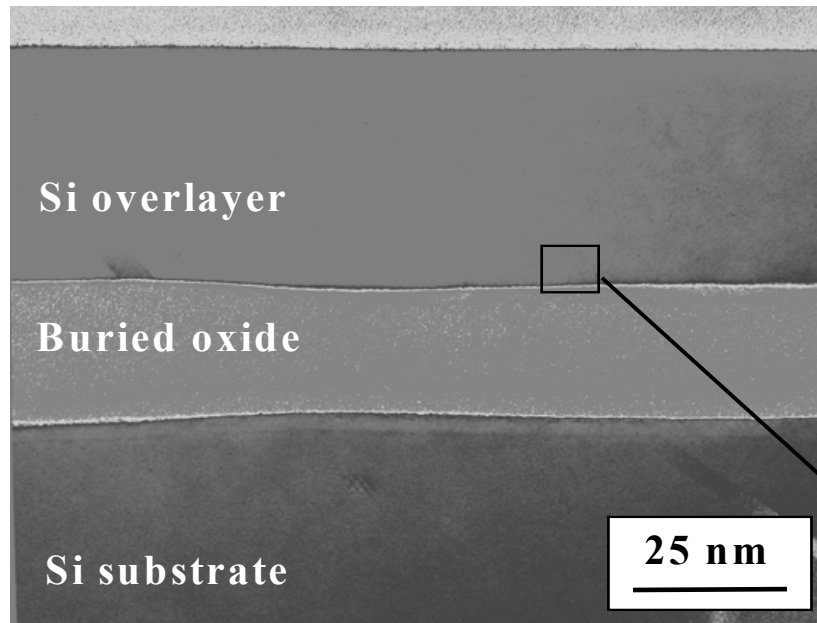
# Shallow Junction Data from IBM / Infineon



# SPIMOX (Separation by Plasma Implantation of Oxygen)



# XTEM of SPIMOX Sample

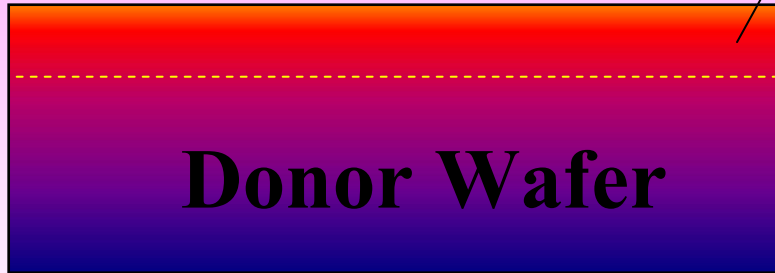
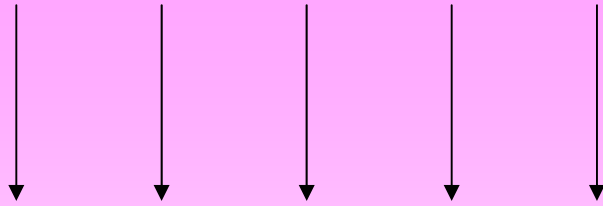




# PIII / Ion-Cut

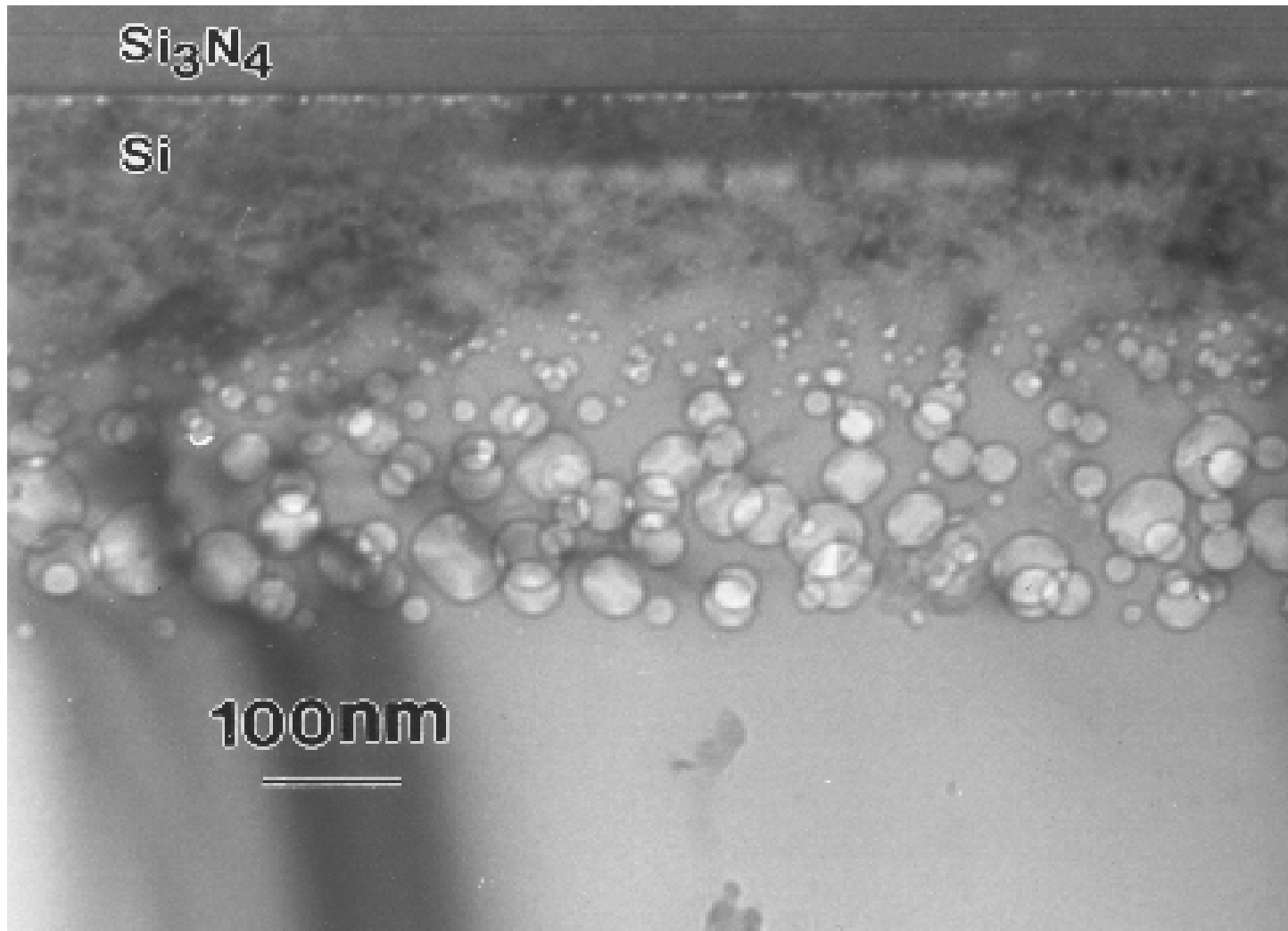
**Hydrogen  
Plasma**

**Hydrogen  
Implanted  
Layer**

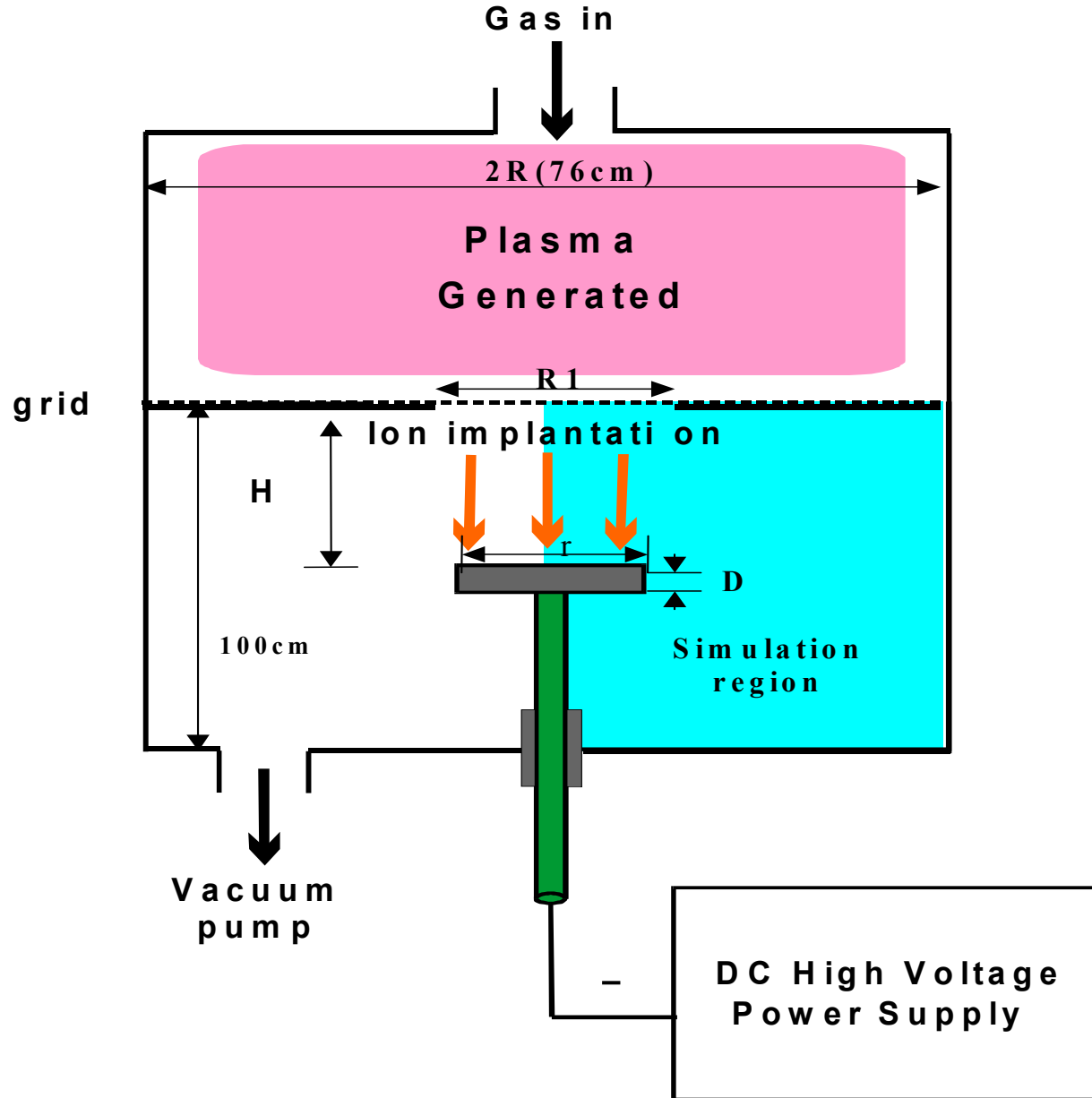


**Donor Wafer**

# Microcavities



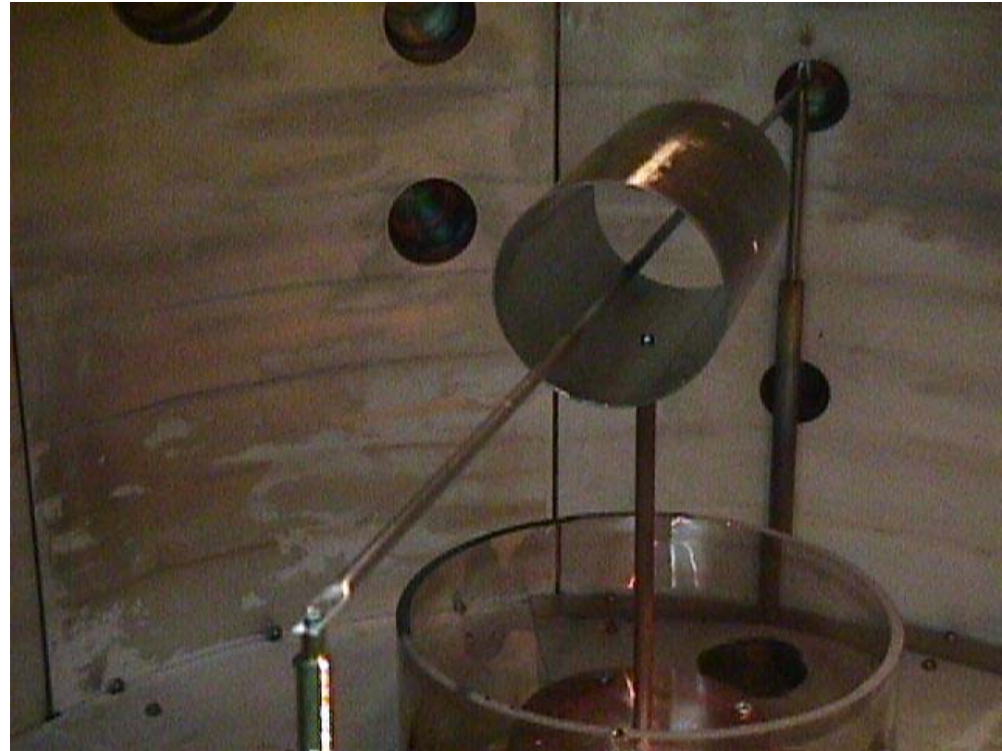
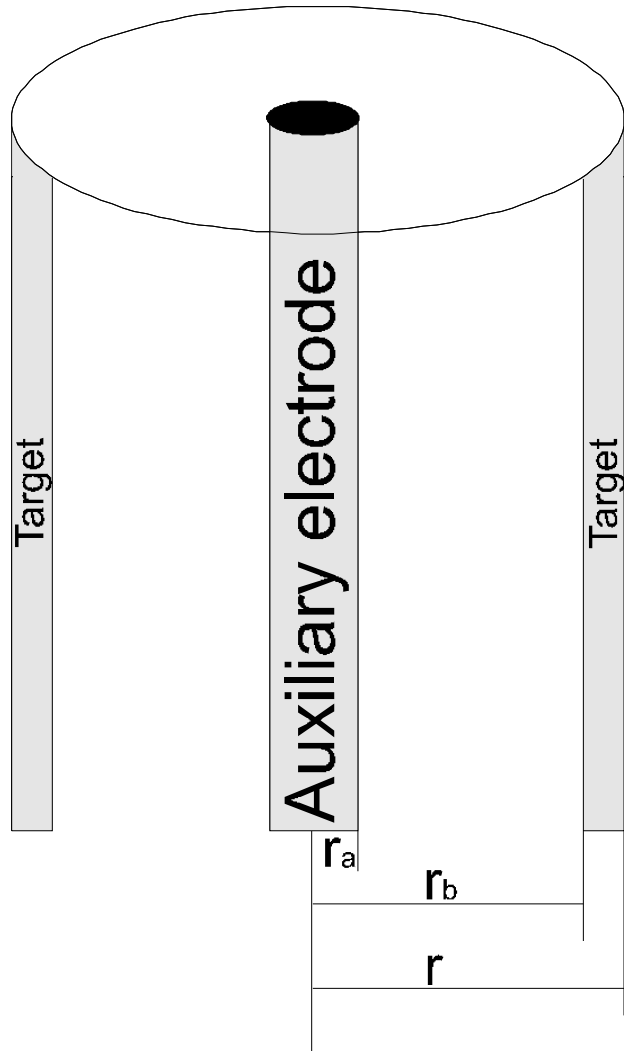
# Direct-Current (DC) PIII



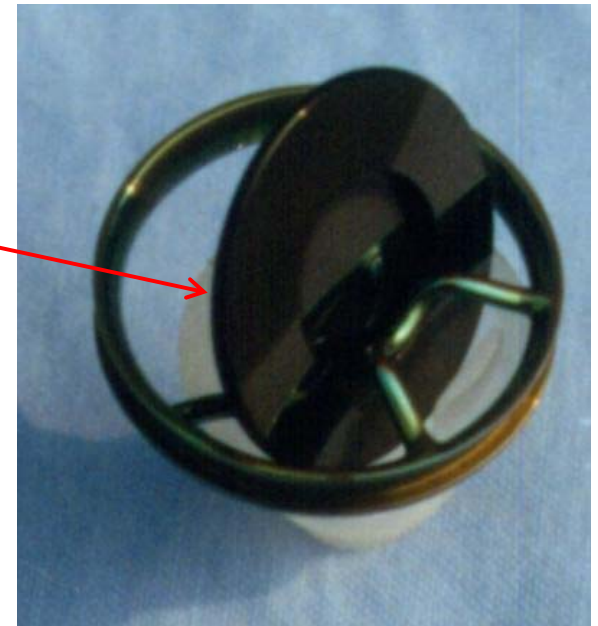
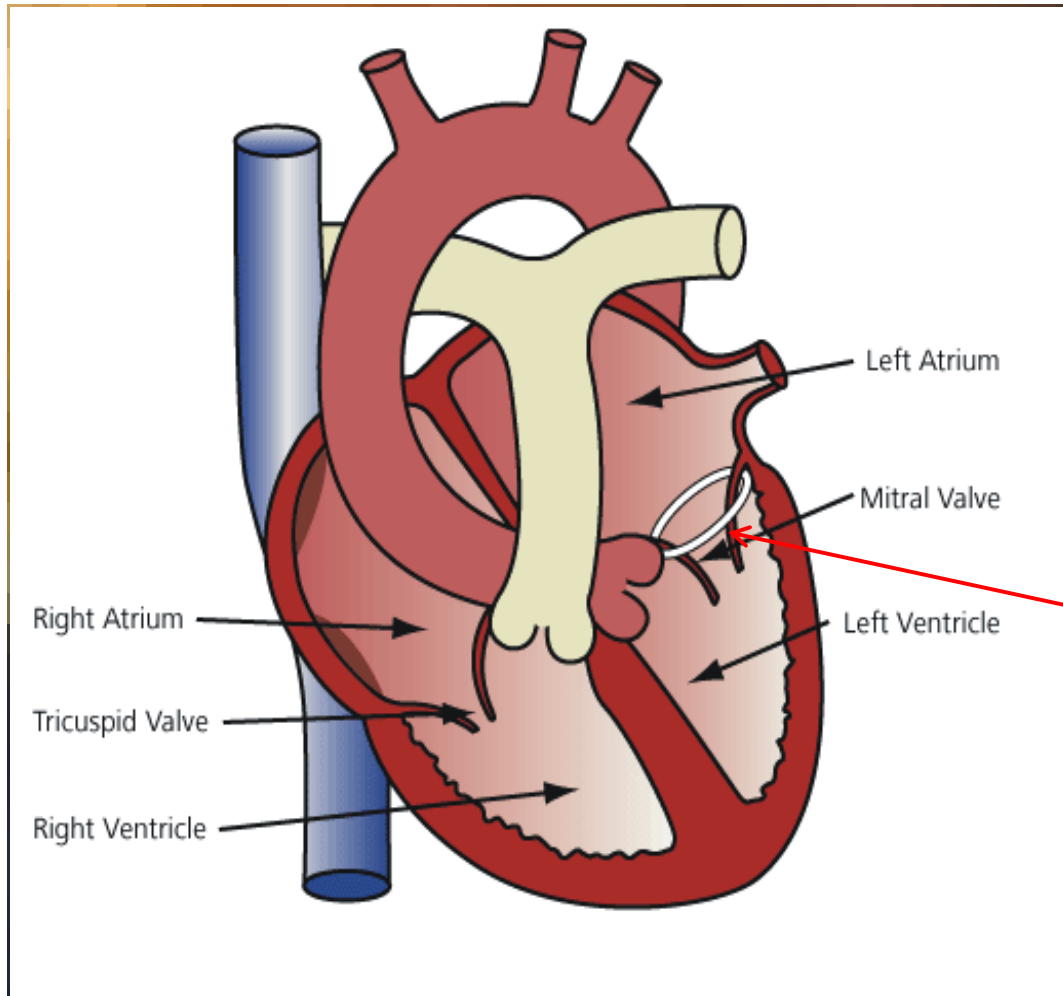
# Advantages of DC-PIII

- Lower instrument cost (power modulator not necessary)
- Less sputtered contaminants
- Higher efficiency
- More mono-energetic ion distribution
- Higher practical ion implantation voltage

# PIII of Oil Pumps



# Artificial Heart Valves

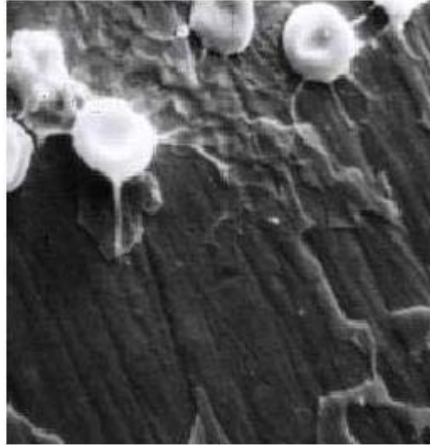


# In-Vivo Experiments

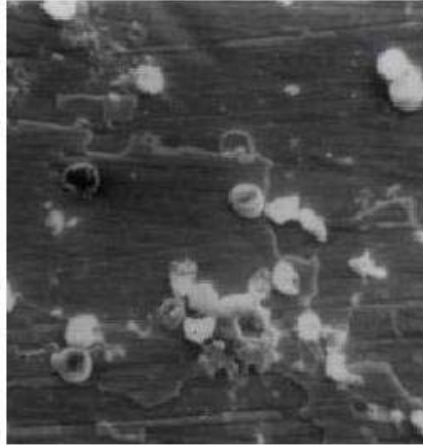
- $\text{Ti}(\text{Ta}^{5+})\text{O}_2$  synthesized by PIII-D and LTIC (control) are affixed onto the ventral aorta and right auricle of the same dog
- The materials are taken out of the dog after 17 days to determine biocompatibility

# Platelet morphology (SEM)

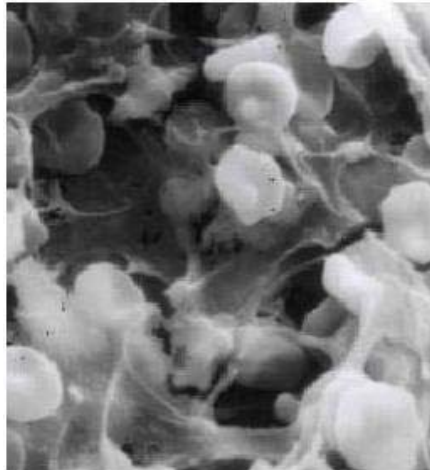
**Ti(Ta<sup>+5</sup>)O<sub>2</sub>  
film  
[3000×]**



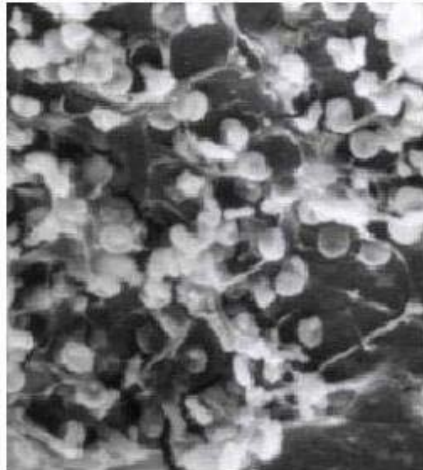
**Ti(Ta<sup>+5</sup>)O<sub>2</sub>  
film  
[1000×]**



**LTIC  
[3000×]**



**LTIC  
[1000×]**





# Mesh-Assisted PIII for Insulators

