



# Growth of GaAs

## Godparent Review 2/26/2010

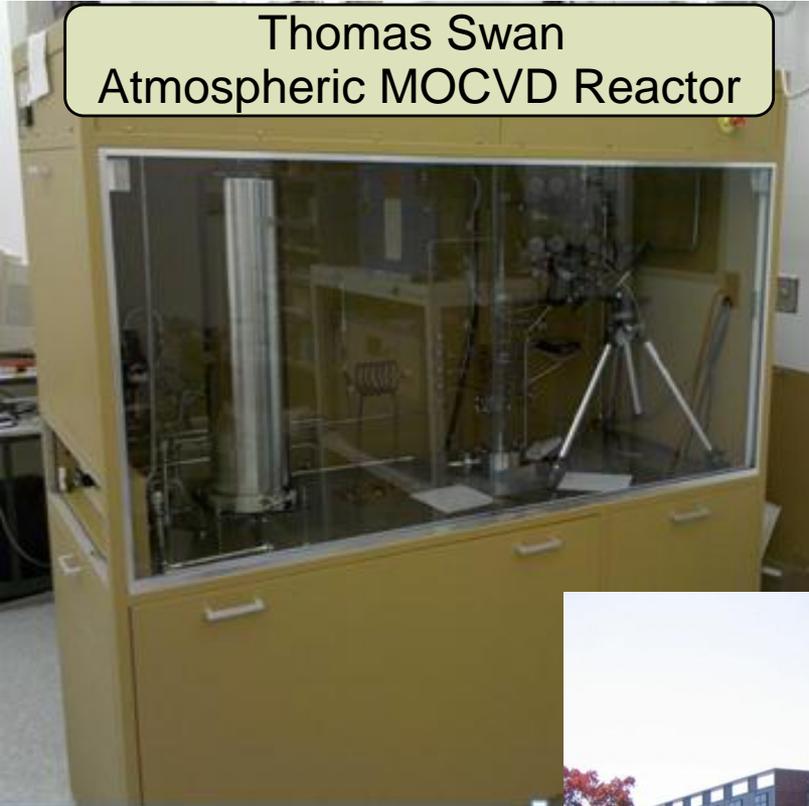


# Overview

- MOCVD Reactors
- Material Capabilities
- Facilities at UIUC
- Role of UIUC and ANL

# MOCVD Reactors

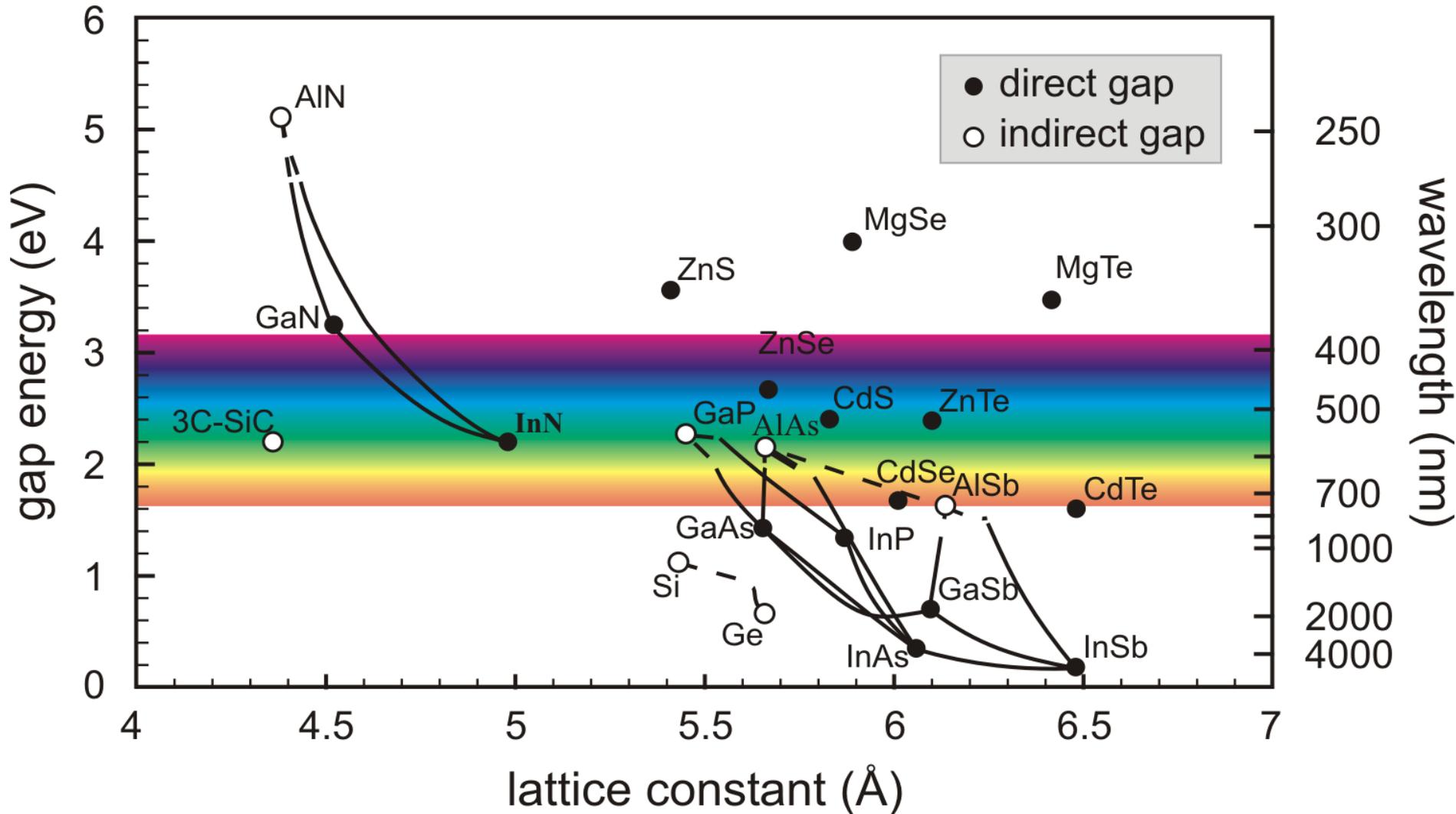
Thomas Swan  
Atmospheric MOCVD Reactor



Aixtron Low Pressure  
MOCVD Reactor



Micro and Nanotechnology Lab



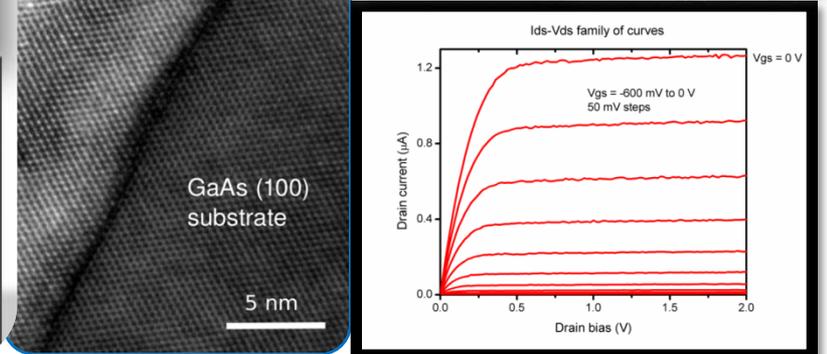
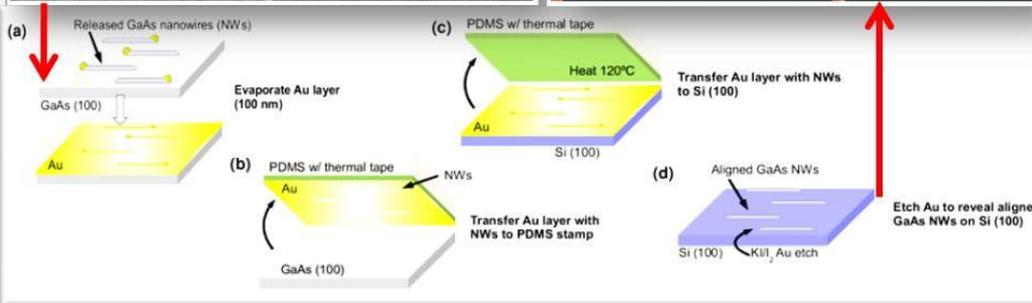
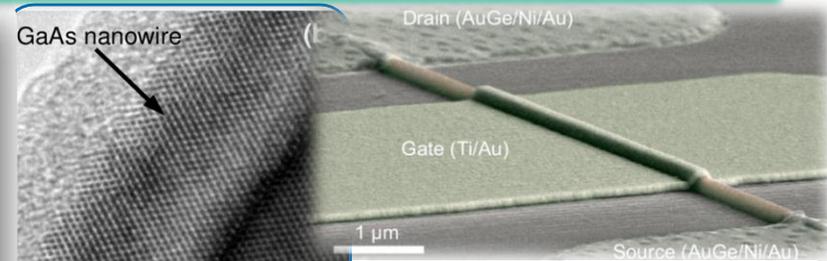
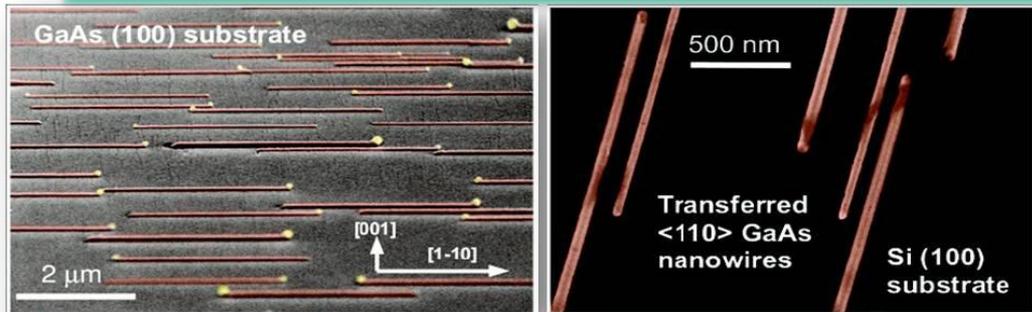


# III-V Semiconductors

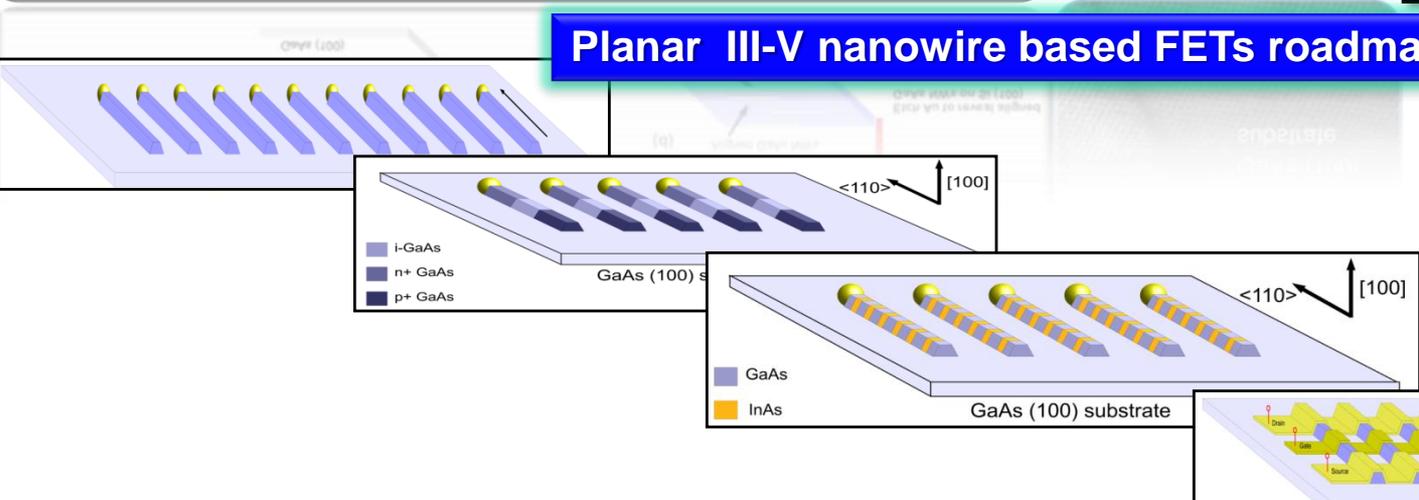
IIIA	IVA	VA
5 <b>B</b>	6 <b>C</b>	7 <b>N</b>
13 <b>Al</b>	14 <b>Si</b>	15 <b>P</b>
31 <b>Ga</b>	32 <b>Ge</b>	33 <b>As</b>
49 <b>In</b>	50 <b>Sn</b>	51 <b>Sb</b>

- Custom made alloys
  - Group III: Al, Ga, In
  - Group V: As
    - Phosphorous being installed
- Dopants
  - N-type: Si
  - P-type: Zn, C
  - 1 Expansion Aixtron

**MOCVD epitaxial, self-aligned along  $\langle 110 \rangle$ , transfer-printable to Si, defect-free and high mobility**



**Planar III-V nanowire based FETs roadmap**





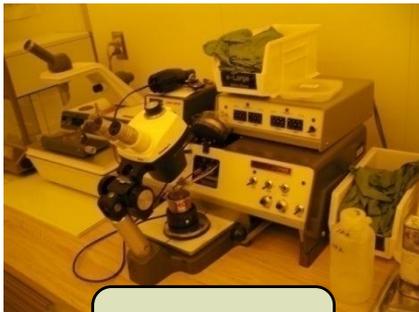
# Other Facilities



E-Beam  
Lithography



MRL



Packaging



Beckman Institute

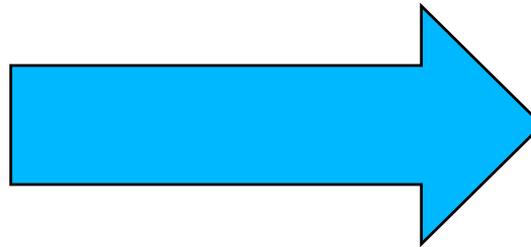
- Lithography
  - E-beam
  - Photo
  - Large Area
  - Nano Imprint
- Scanning Electron Microscope
- Atomic Force Microscope
- CVD
- MBE
- Atomic Layer Deposition
- Materials Research Laboratory
- Beckman Institute



# Role of UIUC and Argonne

## University of Illinois

- Growth of Photocathode
- Release of Active Layers from Substrate
- Transfer of Photocathode



## Argonne National Lab

- Bonding of Photocathode
- Cleaning of Surface
- Activation with Cs/O