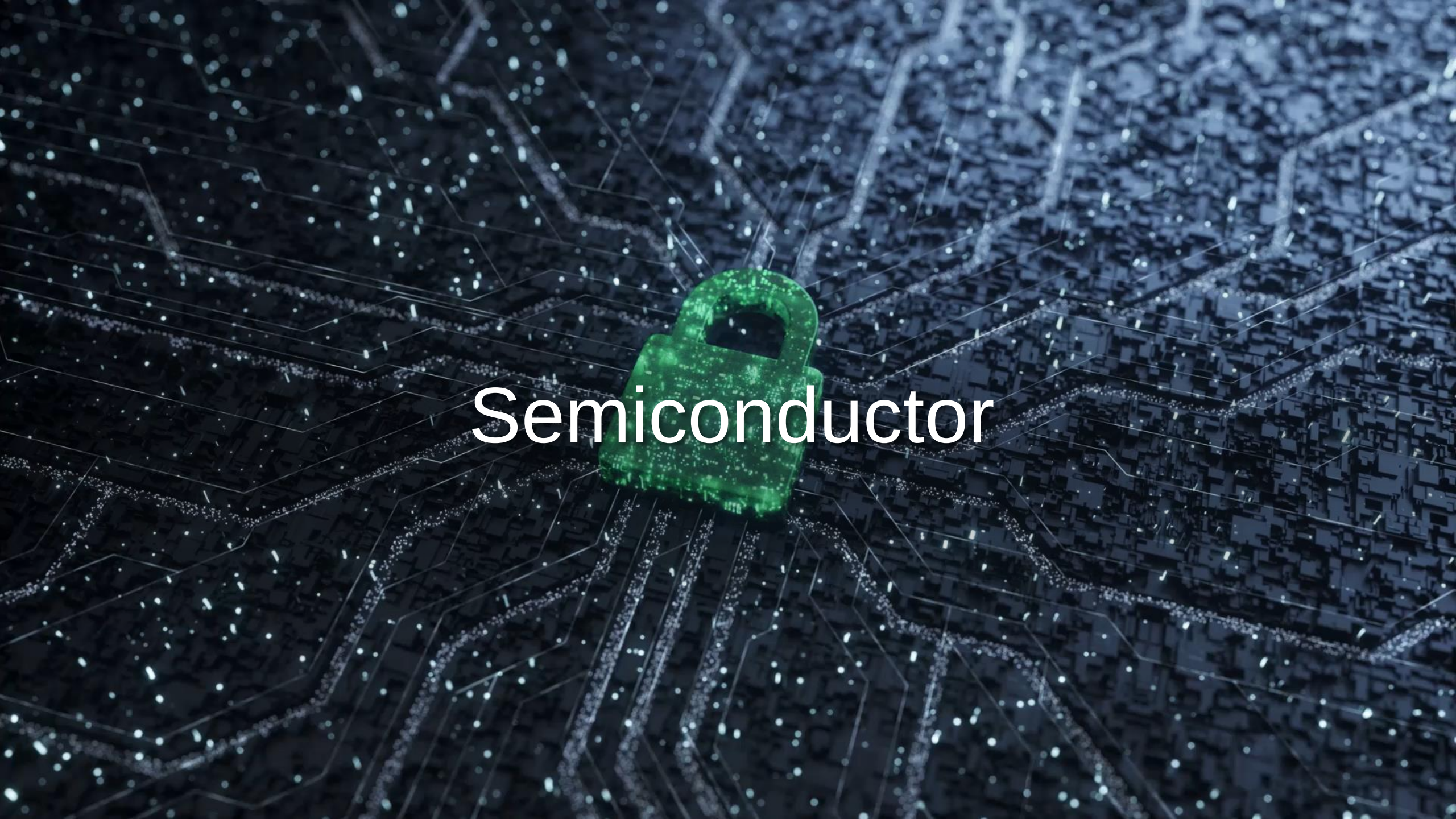
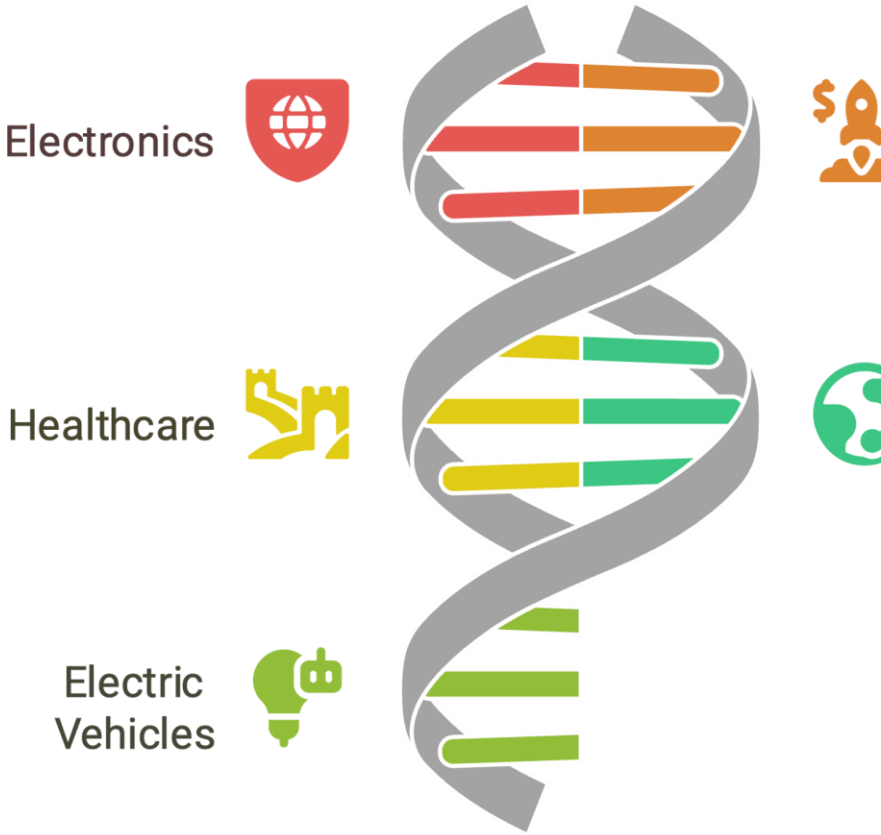

Semiconductor

Investing in the Future of Technology Through Semiconductors



The Semiconductor Investment Landscape

Strategic Importance

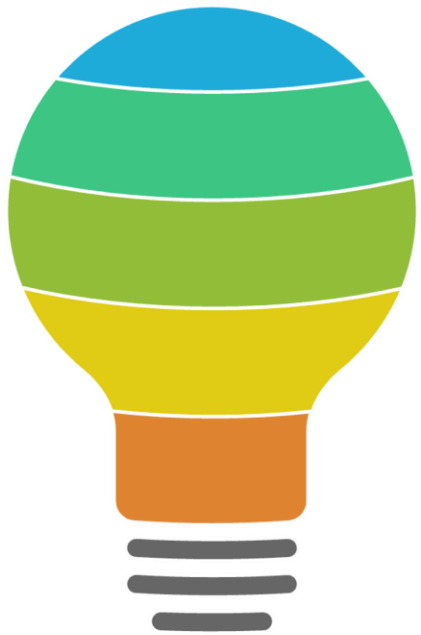
Semiconductors as national security assets

High Barriers to Entry

Complexity and capital requirements limit players

Innovation Powerhouse

Driving advancements in technology



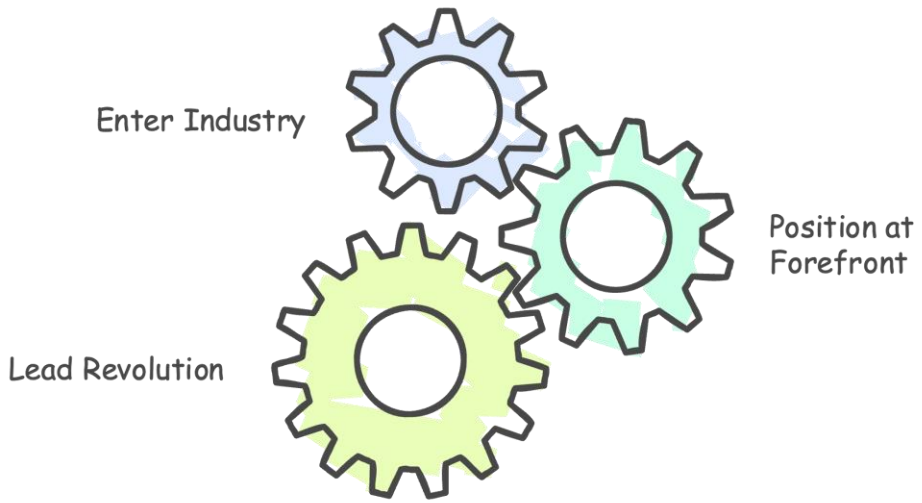
Explosive Demand Growth

Market projected to surpass $1 trillion by 2030

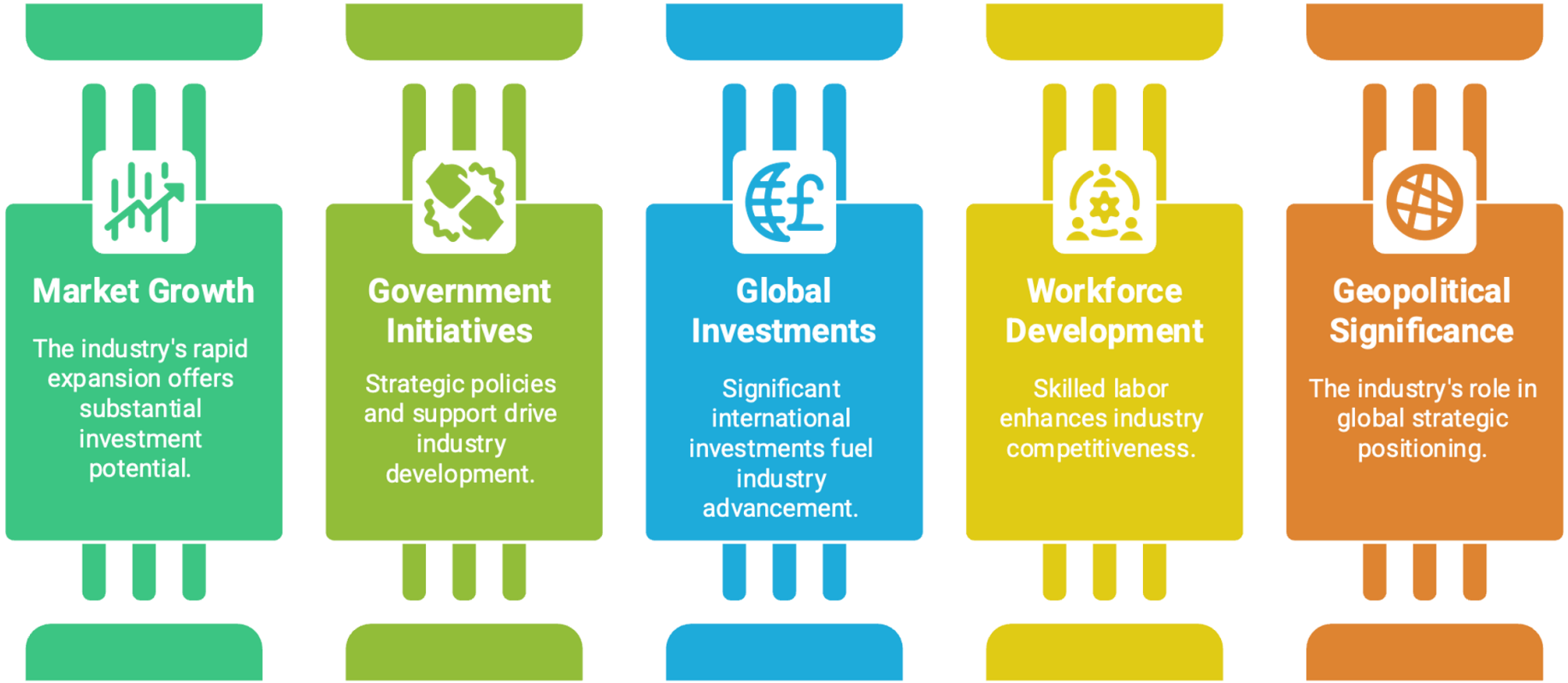
Global Supply Chain Shifts

Diversification and localization opportunities

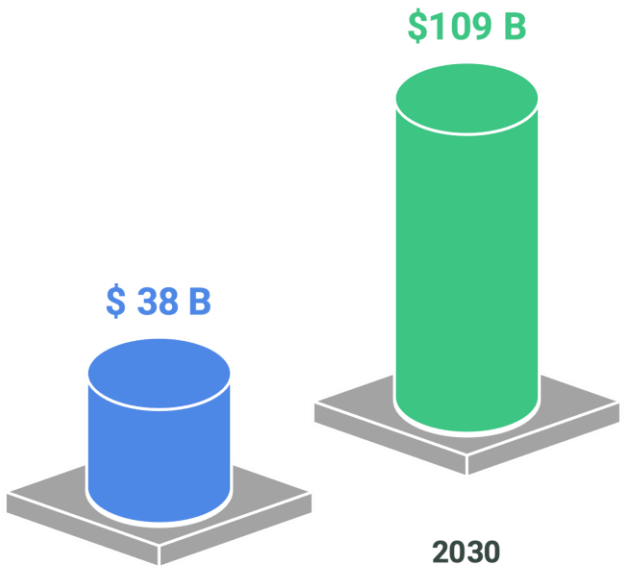
Journey to Lead Digital Transformation



Investing in India's Semiconductor Industry for Future Growth



Growth of India's Semiconductor Market



2030

Projected market value with sector growth

2023-24

Current market value driven by demand

Semiconductor investments in India

NXP Semiconductors

Investing over $1 billion in R&D.

Lam Research

Investing over $1 billion in Karnataka.

Tata Group

Establishing assembly and test facility.

India's Semiconductor Strategy

Strategic Partnerships

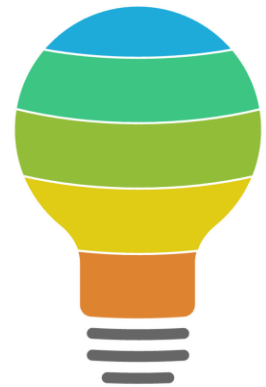
Collaborations with other nations to enhance semiconductor capabilities

Semiconductor Fabrication Plants

Facilities for producing semiconductors to meet national security needs

Global Supply Chain Role

Positioning India as a significant contributor to the global semiconductor market



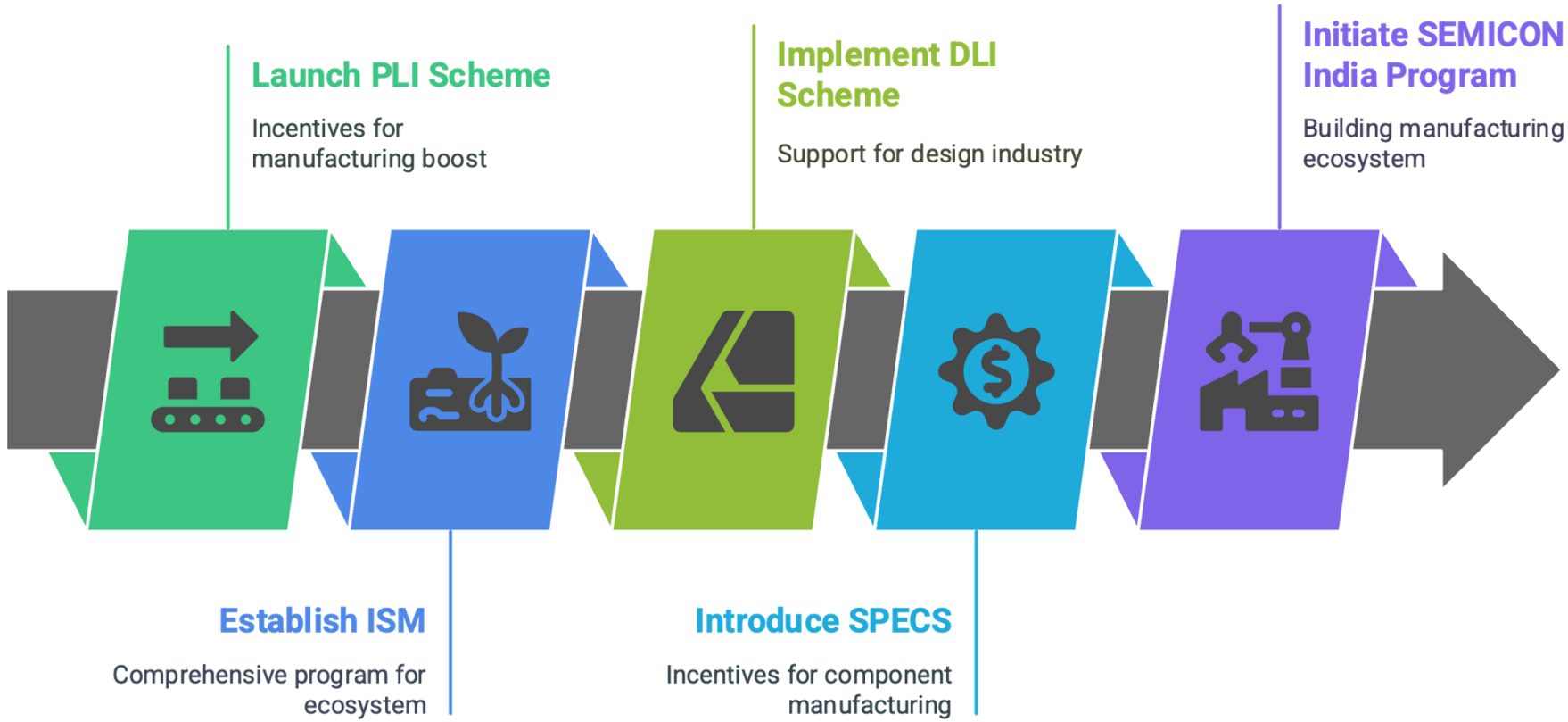
CHIPS and Science Act

U.S. legislation supporting semiconductor manufacturing in India

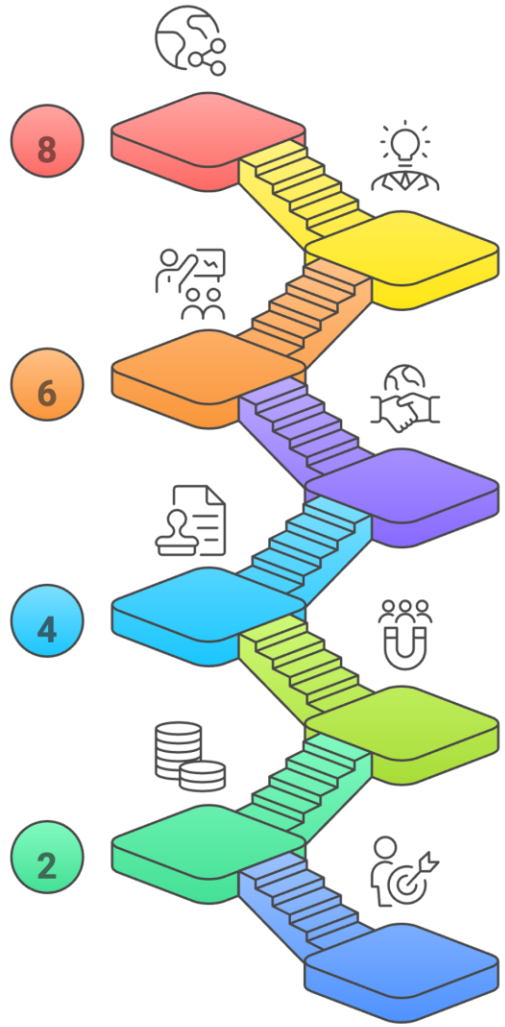
National Security Needs

Ensuring a secure supply of semiconductors for defense and critical infrastructure

Indian Semiconductor Industry Development



Achieving Semiconductor Hub Status



8 **Global Hub Status**

Achieving the goal of becoming a global semiconductor hub

7 **Research & Development**

Investing in cutting-edge research and innovation

6 **Workforce Development**

Training and educating a skilled workforce

5 **International Collaborations**

Forming partnerships with global leaders in the industry

4 **Recent Approvals**

Securing necessary approvals for projects and initiatives

3 **Incentive Schemes**

Implementing policies to attract investment and innovation

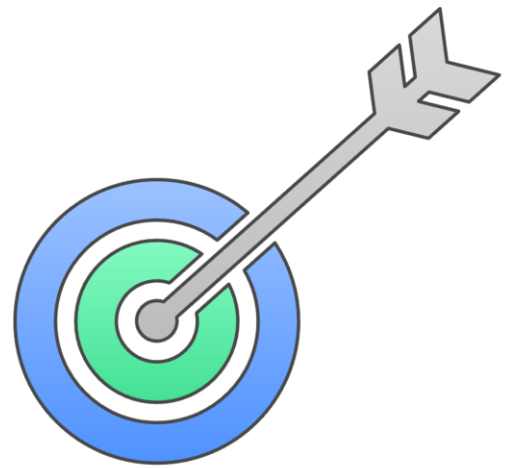
2 **Financial Outlay**

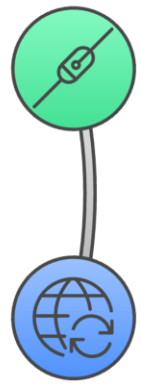
Allocating necessary funds to support the initiative

1 **Strategic Vision**

Establishing a clear roadmap for semiconductor development

India Semiconductor Mission's Strategic Goals



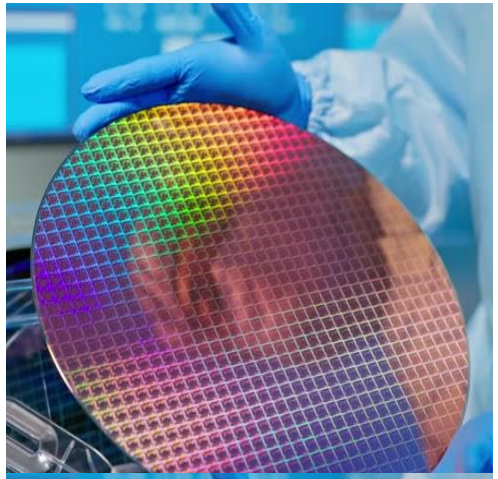


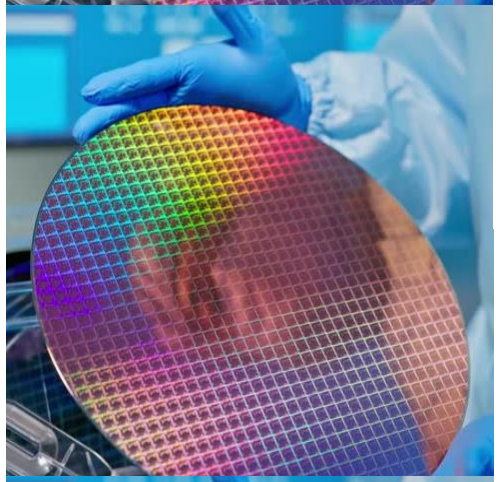
Self-Reliance in Electronics and Semiconductors

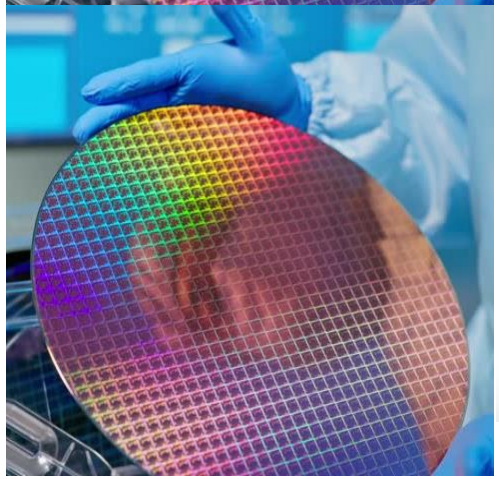
Core goal of the mission

Global Technology Player

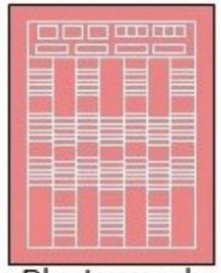
Positioning India in the global market



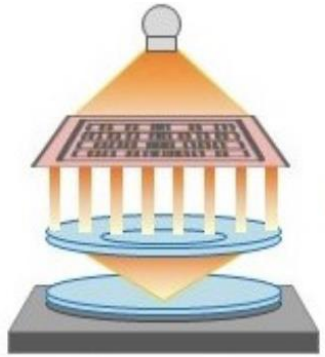




Circuit and pattern design

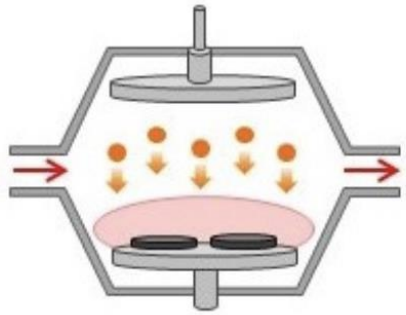


Photomask fabrication



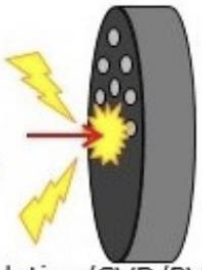
Lithography

Click here!



Etching

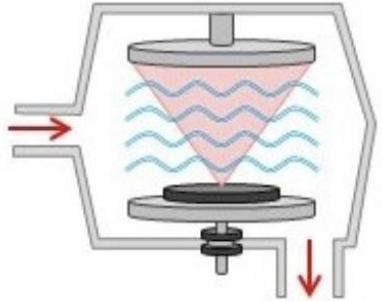
Click here!



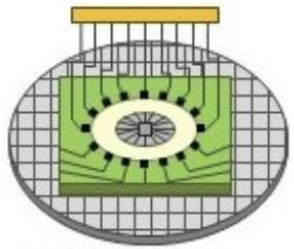
Oxidation/CVD/PVD/ Impurity diffusion/ion-implantation

Click here!

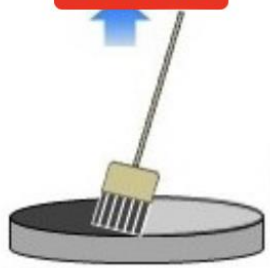
Repetition



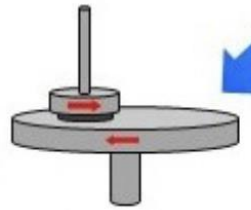
Electrode formation



Wafer inspection

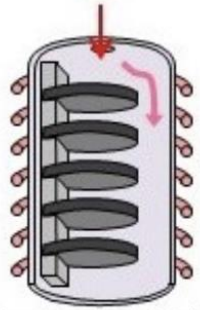


Resist coating



Planarization (CMP)

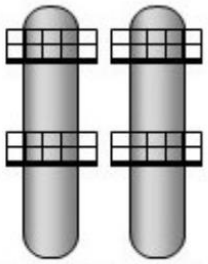
Click here!



Silicon oxide/nitride thin film

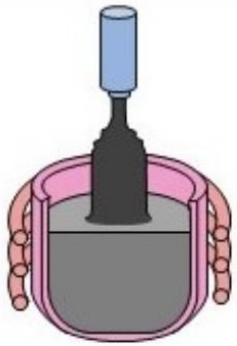
Click here!

Materials



The manufacturing process of polycrystal silicon

Click here!

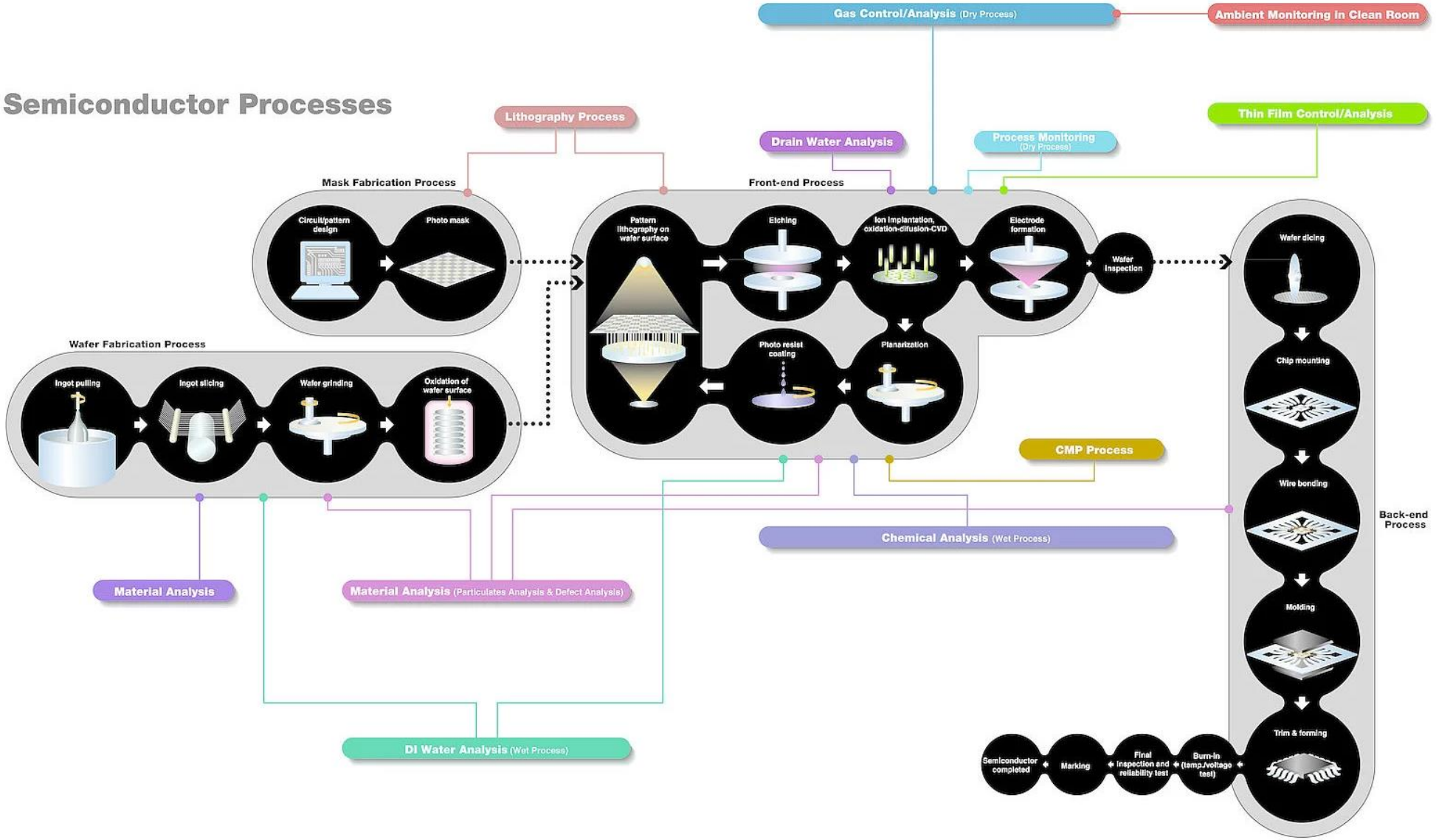


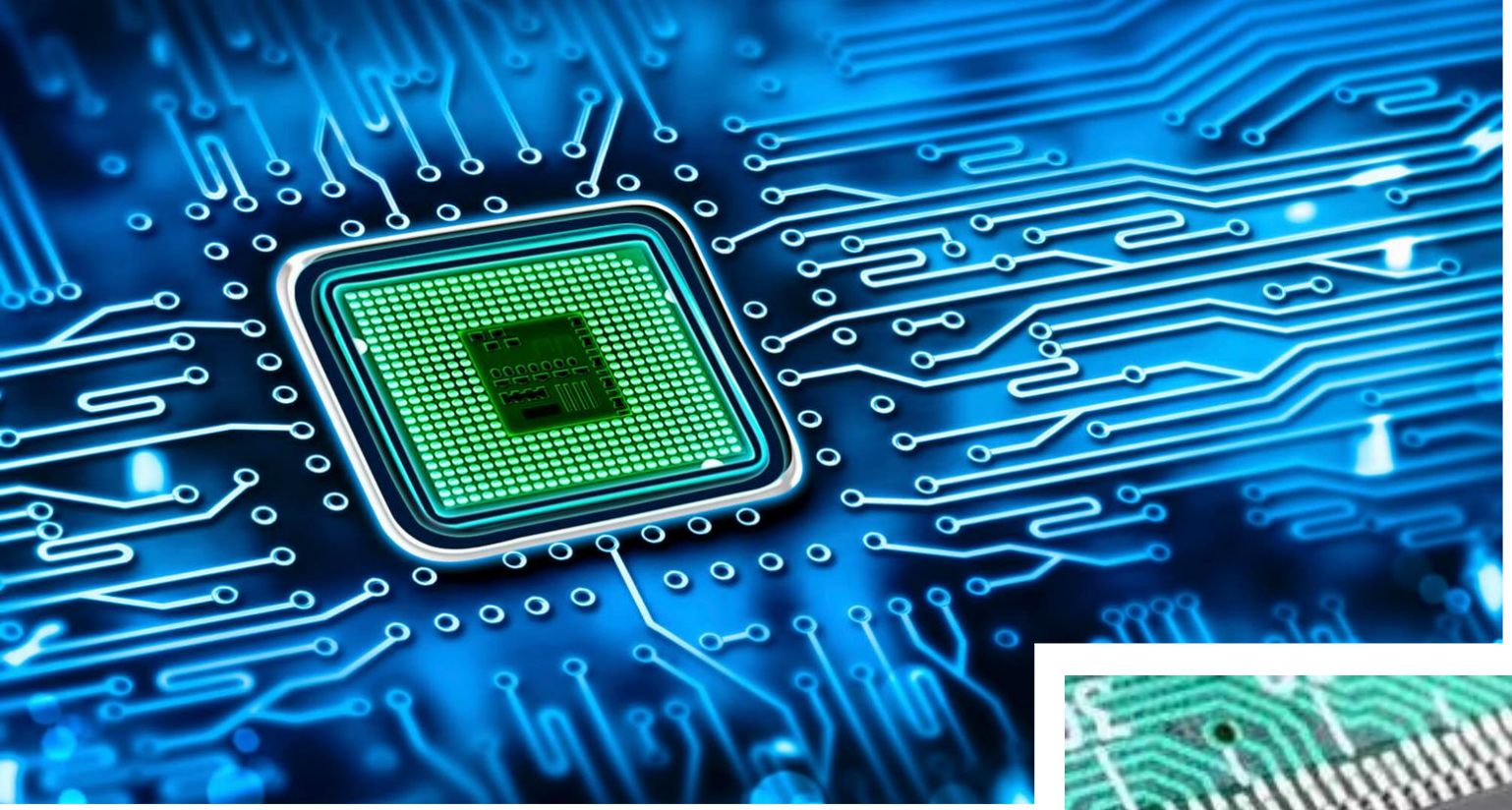
The manufacturing process of silicon ingot.

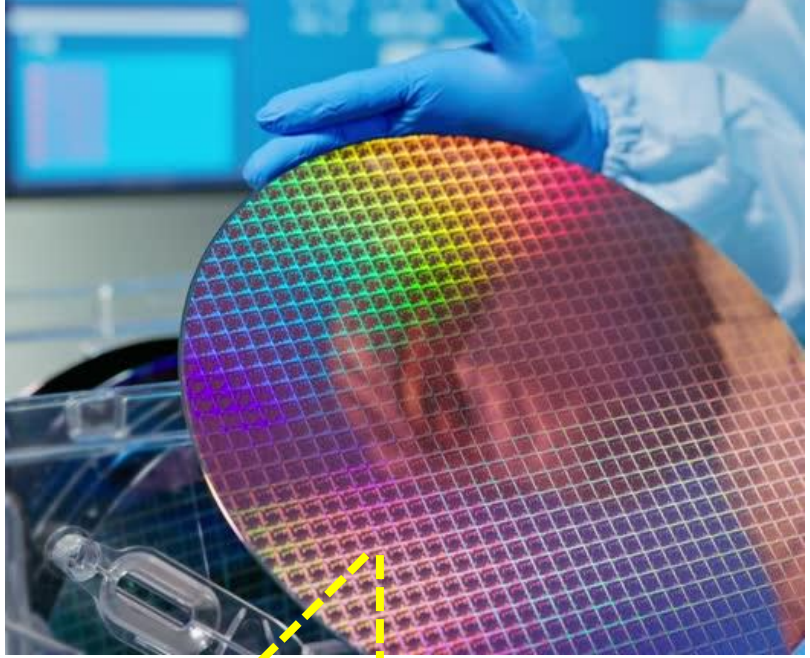
Click here!

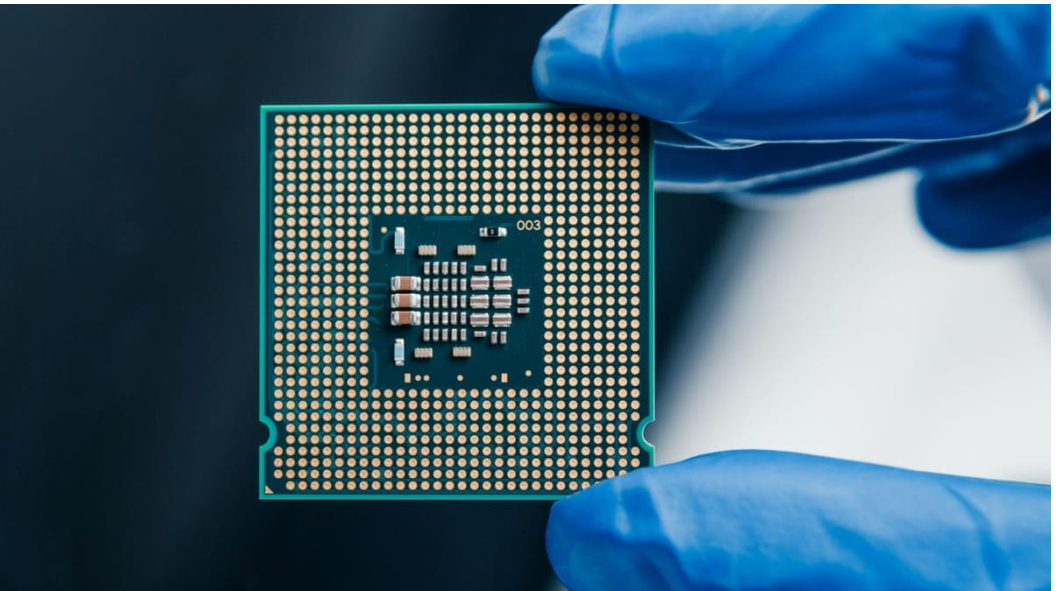
Cutting the ingot

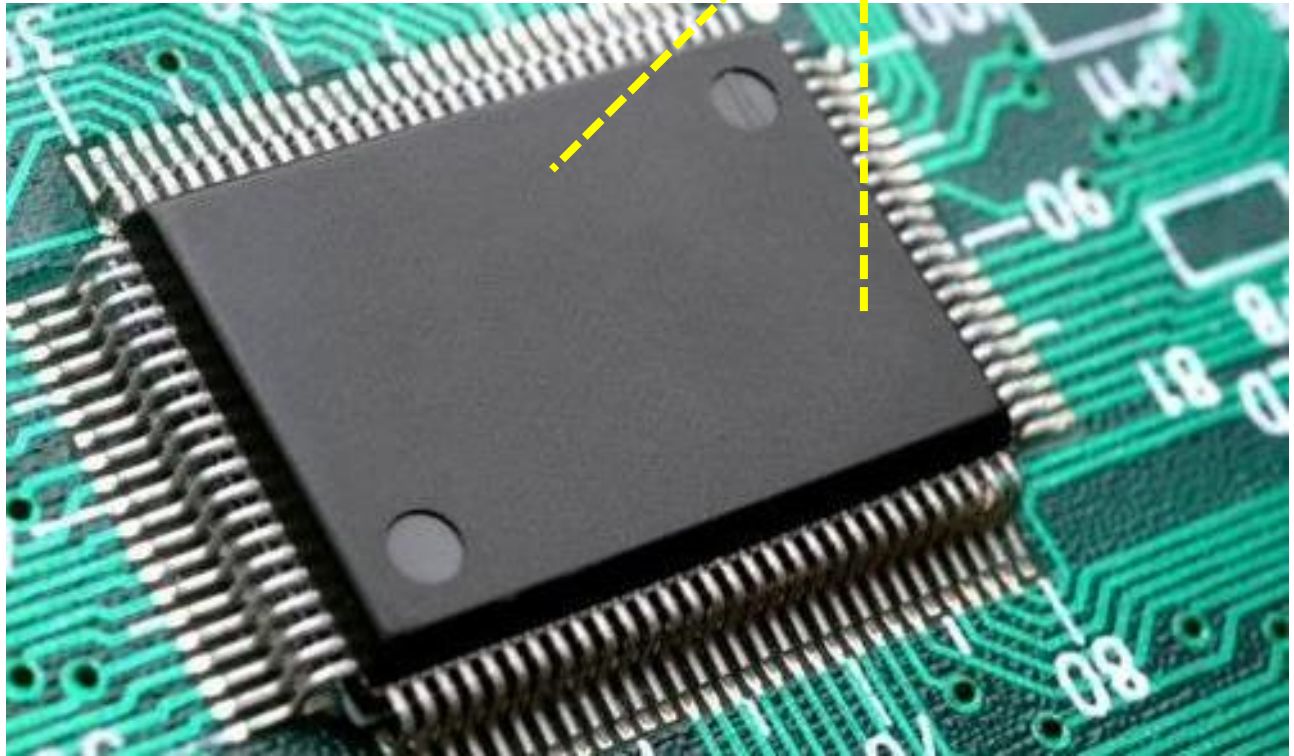
Wafer polishing

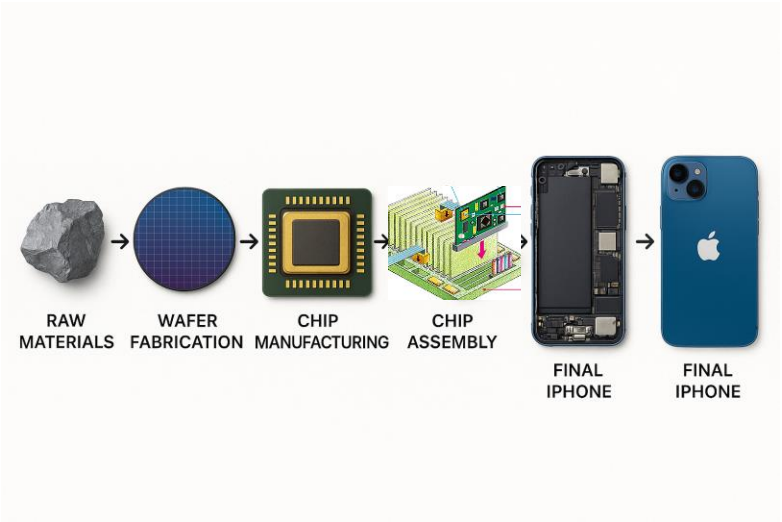

Semiconductor Processes
Gas Control/Analysis (Dry Process)
Ambient Monitoring in Clean Room
Lithography Process
Drain Water Analysis
Process Monitoring (Dry Process)
Thin Film Control/Analysis
Mask Fabrication Process
Front-end Process
Circuit/pattern design
Photo mask
Pattern lithography on wafer surface
Etching
Ion implantation, oxidation-difusion-CVD
Electrode formation
Wafer Inspection
Wafer dicing
Chip mounting
Wire bonding
Molding
Trim & forming
Back-end Process
Wafer Fabrication Process
Ingot pulling
Ingot slicing
Wafer grinding
Oxidation of wafer surface
Photo resist coating
Planarization
CMP Process
Chemical Analysis (Wet Process)
Material Analysis
Material Analysis (Particulates Analysis & Defect Analysis)
DI Water Analysis (Wet Process)
Semiconductor completed
Marking
Final inspection and reliability test
Burn-in (temp./voltage test)

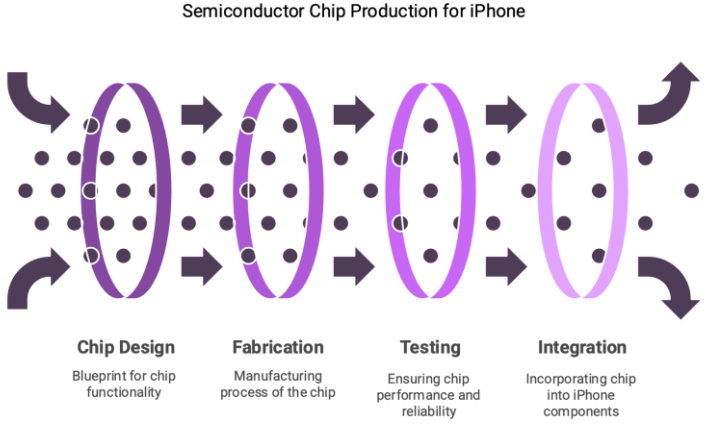


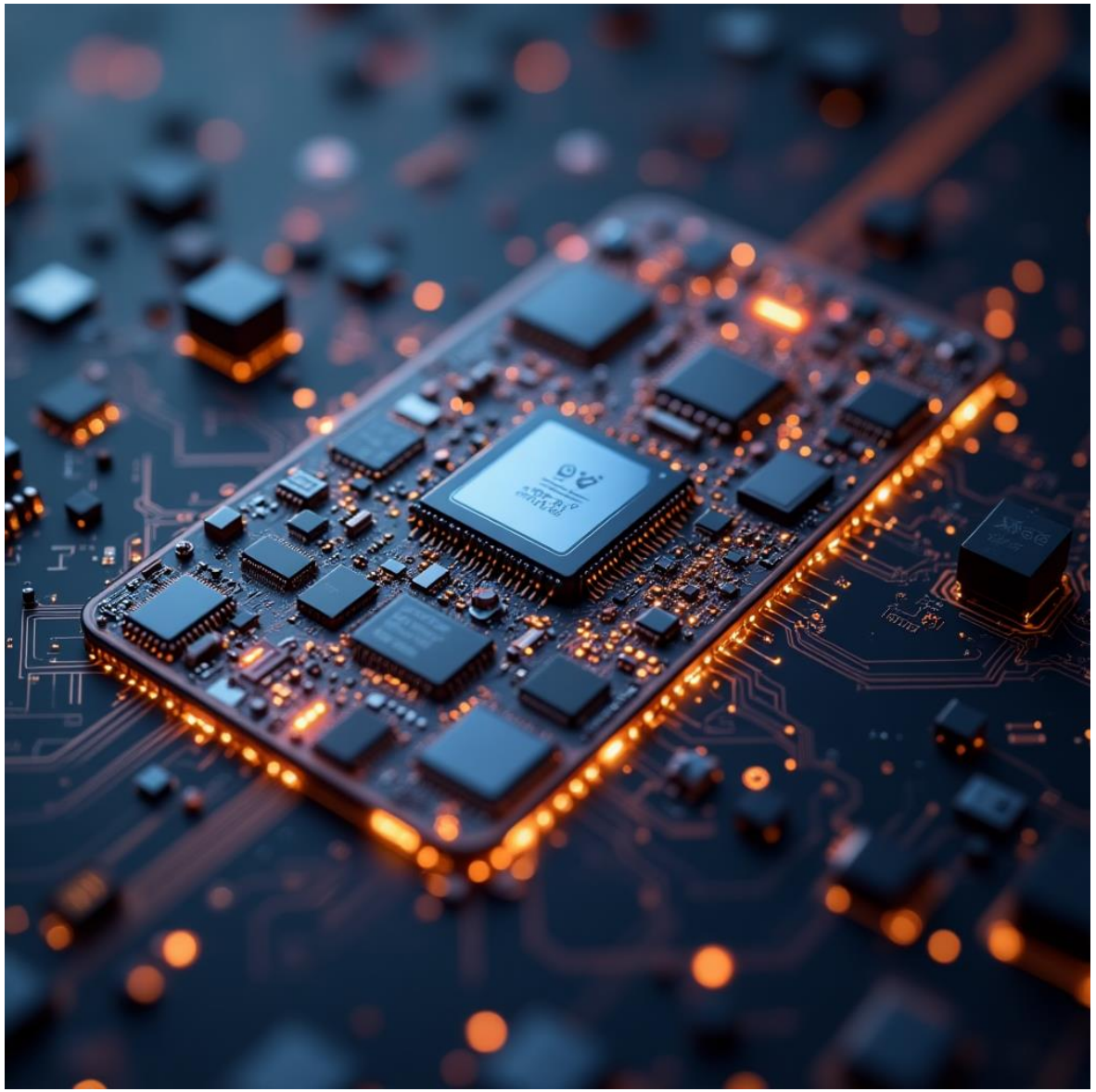


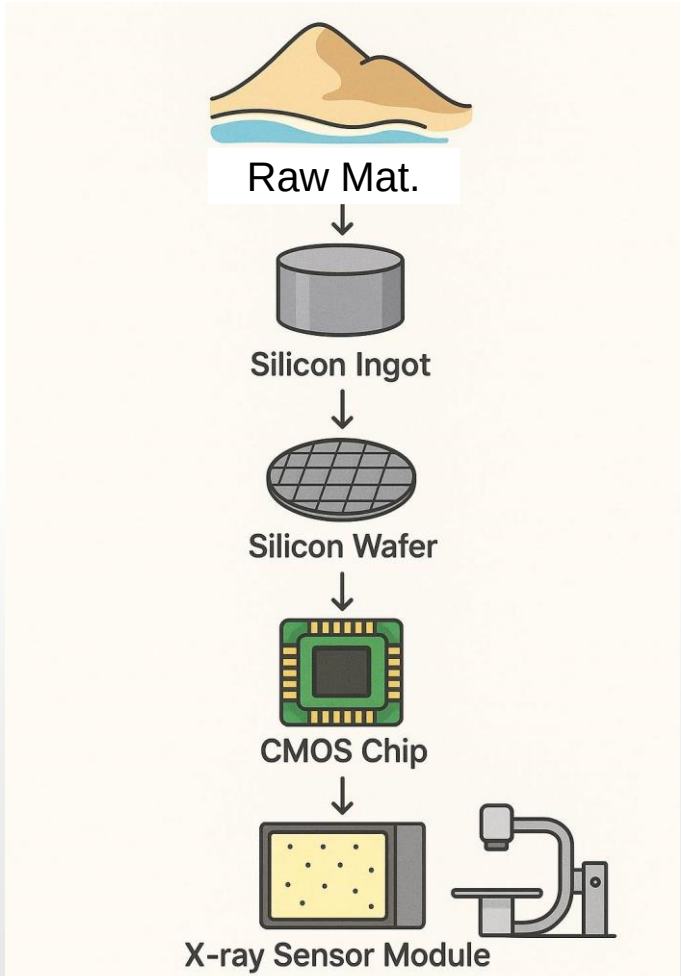





RAW MATERIALS
WAFER FABRICATION
CHIP MANUFACTURING
CHIP ASSEMBLY
FINAL IPHONE
FINAL IPHONE


Semiconductor Chip Production for iPhone
Chip Design
Blueprint for chip functionality
Fabrication
Manufacturing process of the chip
Testing
Ensuring chip performance and reliability
Integration
Incorporating chip into iPhone components





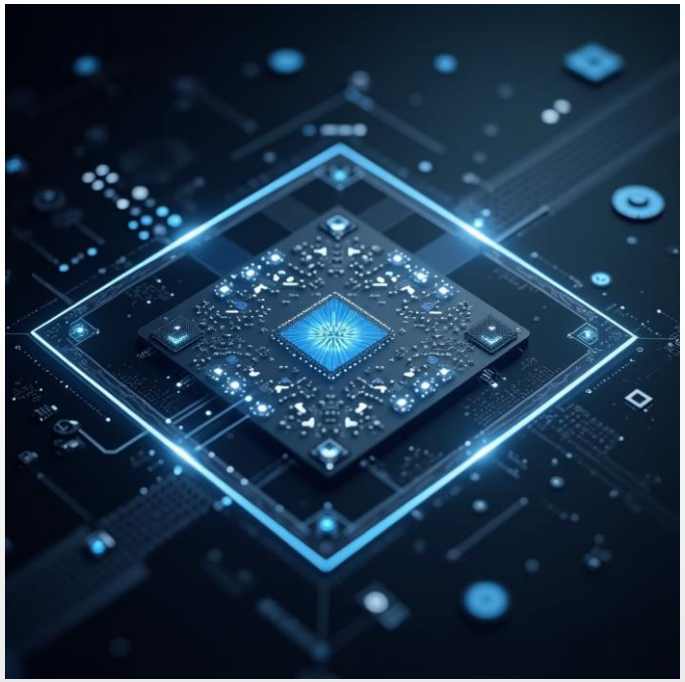
Semiconductor Chip to X-ray Sensor

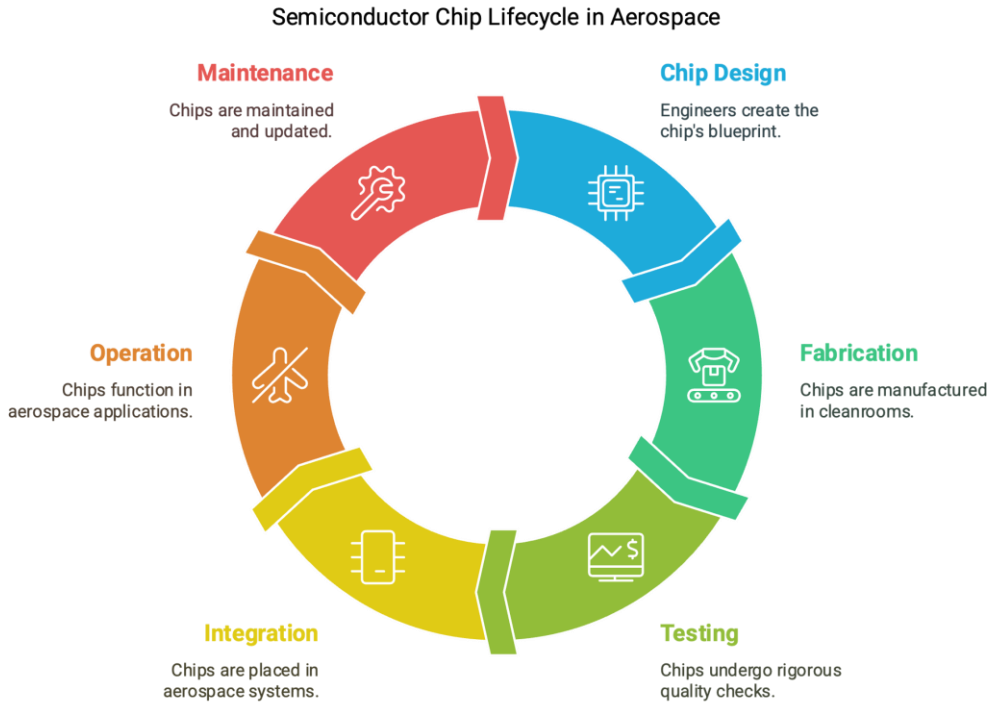
Chip Design
Creating the blueprint for the chip

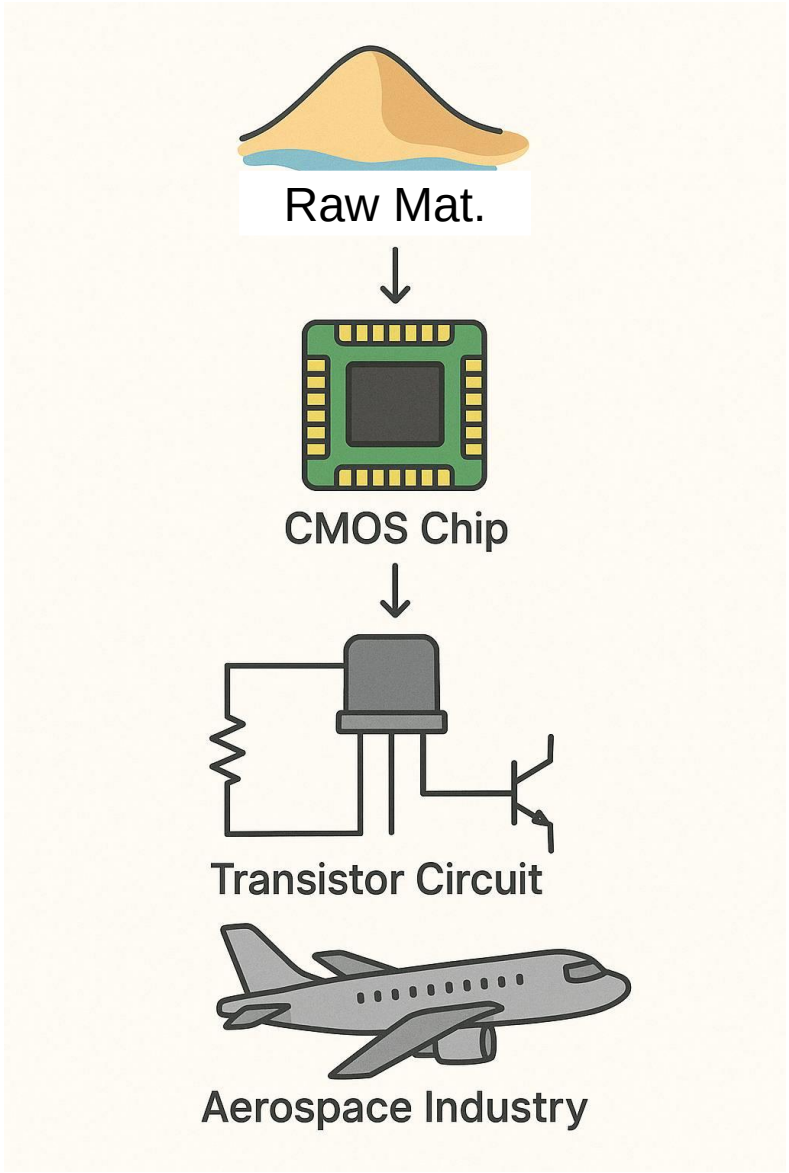
Fabrication
Manufacturing the chip from design

Testing
Ensuring chip functionality and quality

Integration
Incorporating chip into sensor




Semiconductor Chip Lifecycle in Aerospace
Maintenance
Chips are maintained and updated.
Chip Design
Engineers create the chip's blueprint.
Operation
Chips function in aerospace applications.
Fabrication
Chips are manufactured in cleanrooms.
Integration
Chips are placed in aerospace systems.
Testing
Chips undergo rigorous quality checks.


Raw Mat.
CMOS Chip
Transistor Circuit
Aerospace Industry

Semiconductor Chip Production for Military Use

01

Design Phase

Initial planning and blueprint creation

02

Fabrication Process

Manufacturing of the chip components

03

Testing and Quality Control

Ensuring the chip meets standards

04

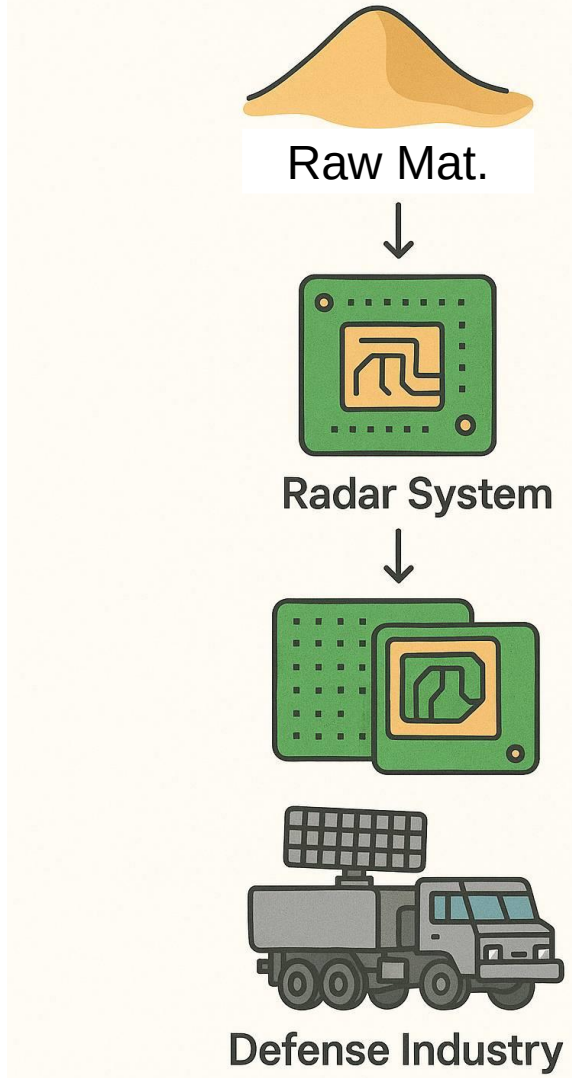
Integration into Instruments

Embedding the chip into military devices

05

Deployment in Military Applications

Utilizing the chip in defense systems



Essential Materials for Semiconductor Manufacturing

Silicon
A fundamental material for semiconductors

Gallium
Used in compound semiconductors

Germanium
Another key semiconductor material

Copper
Essential for electrical conductivity

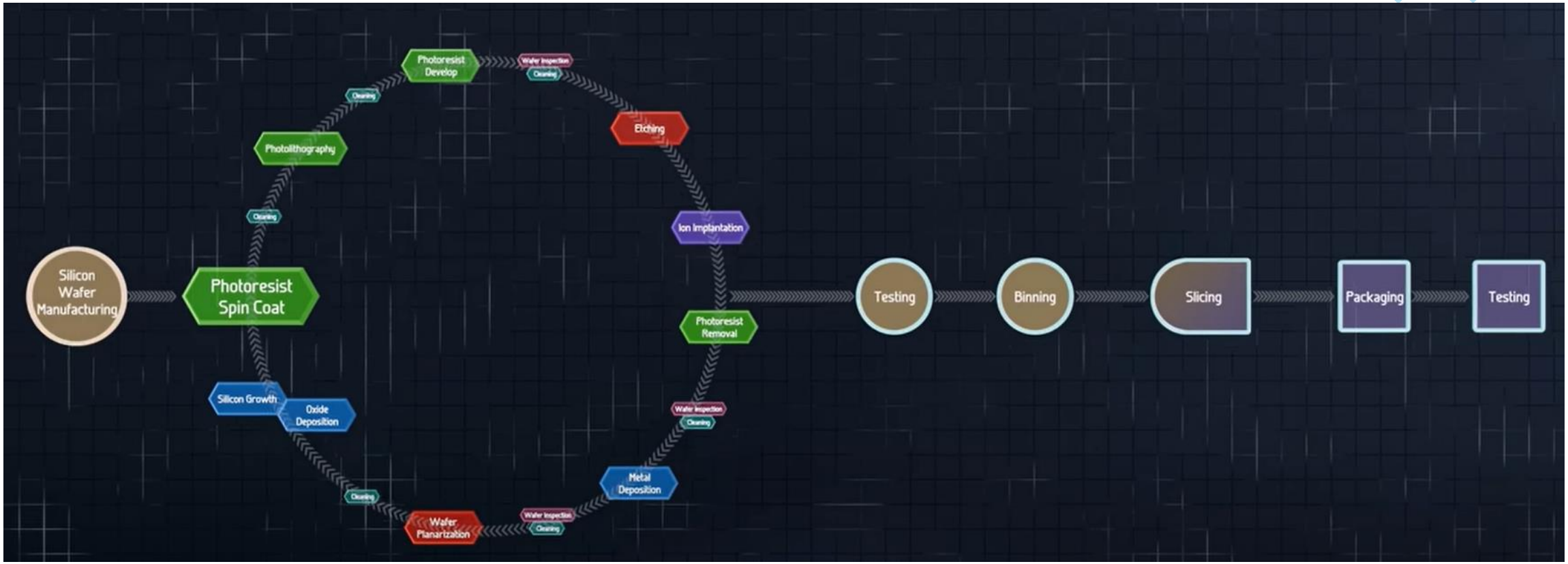
Aluminum
Used for interconnects and packaging

Rare Earth Elements
Critical for specialized applications

Chemicals and Gases
Necessary for various manufacturing processes

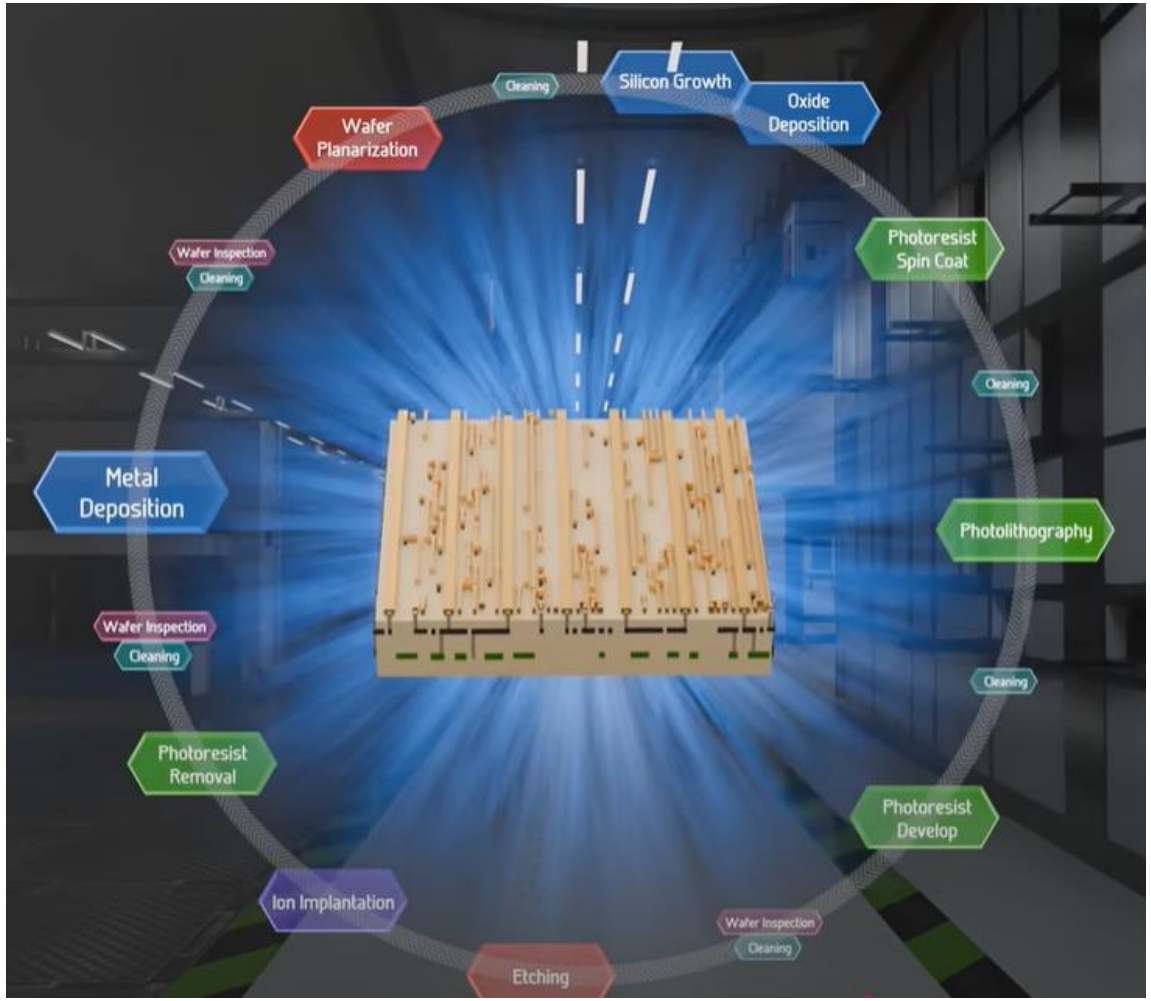
Availability of Materials in India

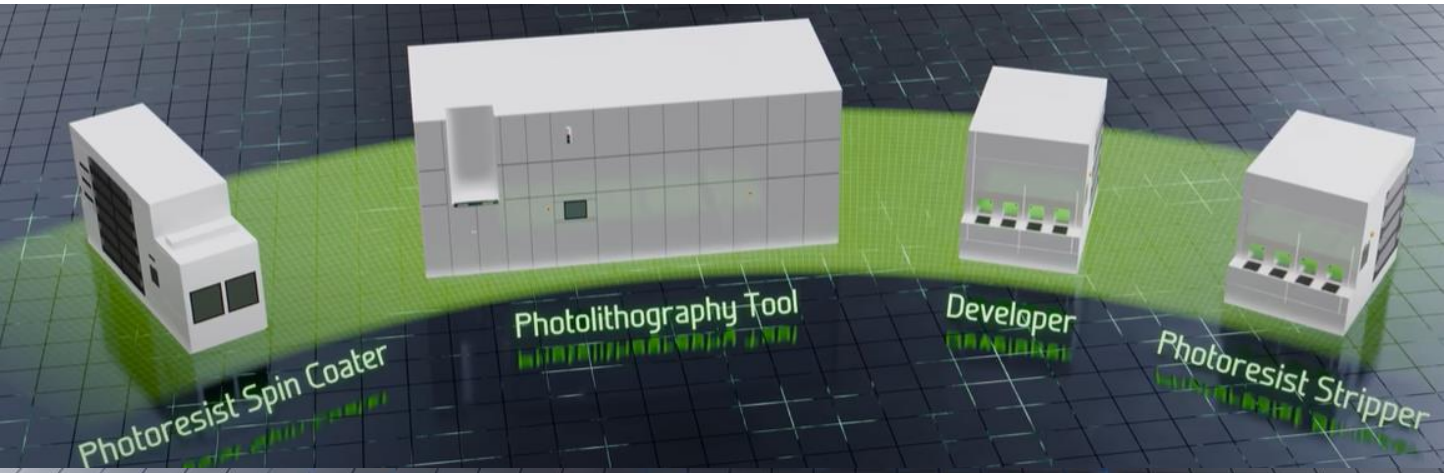
Material	Availability
Silicon	Available
Gallium	Available
Germanium	Available
Copper	Available
Aluminum	Available
Rare Earth Elements (REEs)	Available
Chemicals and Gases	Available


Silicon Wafer Manufacturing
Photoresist Spin Coat
Photolithography
Photoresist Develop
Etching
Ion Implantation
Photoresist Removal
Silicon Growth
Oxide Deposition
Metal Deposition
Wafer Planartzation
Cleaning
Wafer Inspection
Testing
Binning
Slicing
Packaging
Testing

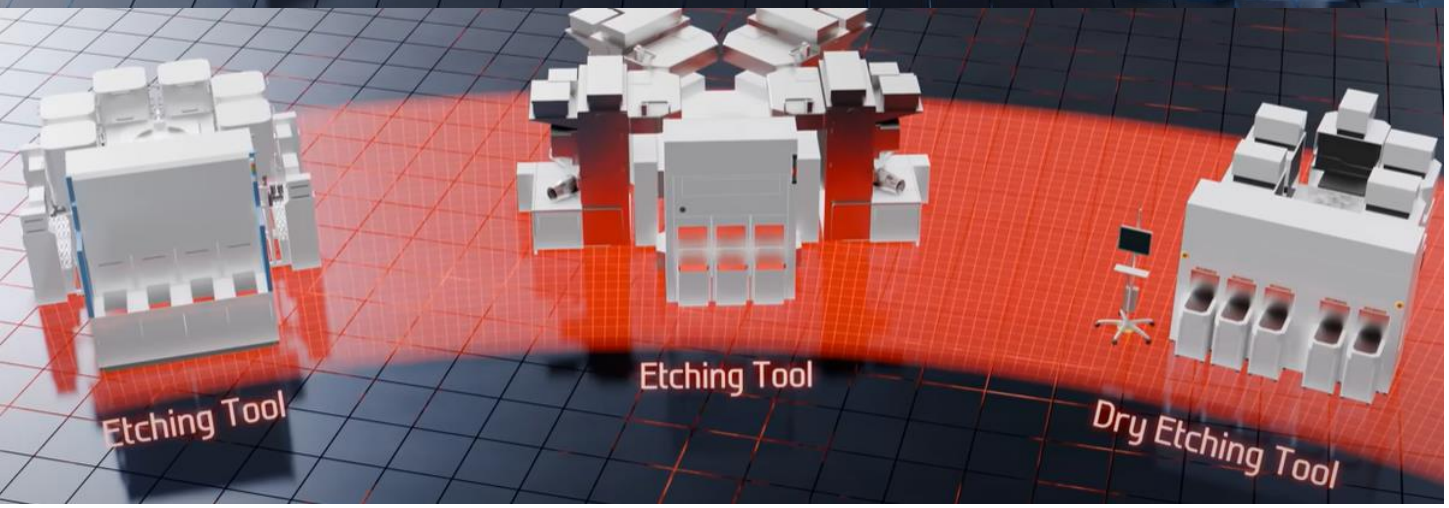

Mask Layer
- Photolithography
- Spin Coater
- Developer
Adding Material
- Chemical Vapor Deposition
- Physical Vapor Deposition
- Atomic Layer Deposition
- Epitaxial Growth
Removing Material
- Plasma Etcher
- Wet Etcher
- Chemical Mechanical Planarization
Modifying Material
- Ion Impantater
- Annealer
Cleaning
- Wet Bench
- Ultrasonic Cleaner
- Megasonic Cleaner
- Spin Rinse Dryer
Inspecting
- Optical Microscope
- Scanning Electron Microscope
- Focused Ion Beam
- Defect Inspection System

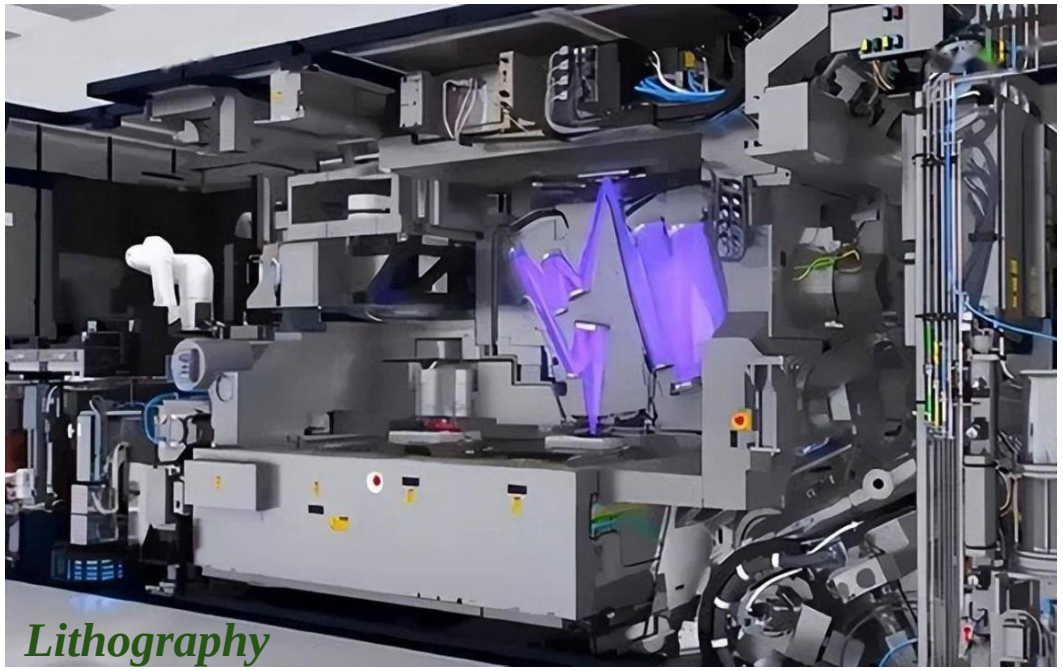

Mask Layer
- Photolithography
- Spin Coater
- Developer
Adding Material
- Chemical Vapor Deposition
- Physical Vapor Deposition
- Atomic Layer Deposition
- Epitaxial Growth
Removing Material
- Plasma Etcher
- Wet Etcher
- Chemical Mechanical Planarization
Modifying Material
- Ion Impantater
- Annealer
Cleaning
- Wet Bench
- Ultrasonic Cleaner
- Megasonic Cleaner
- Spin Rinse Dryer
Inspecting
- Optical Microscope
- Scanning Electron Microscope
- Focused Ion Beam
- Defect Inspection System

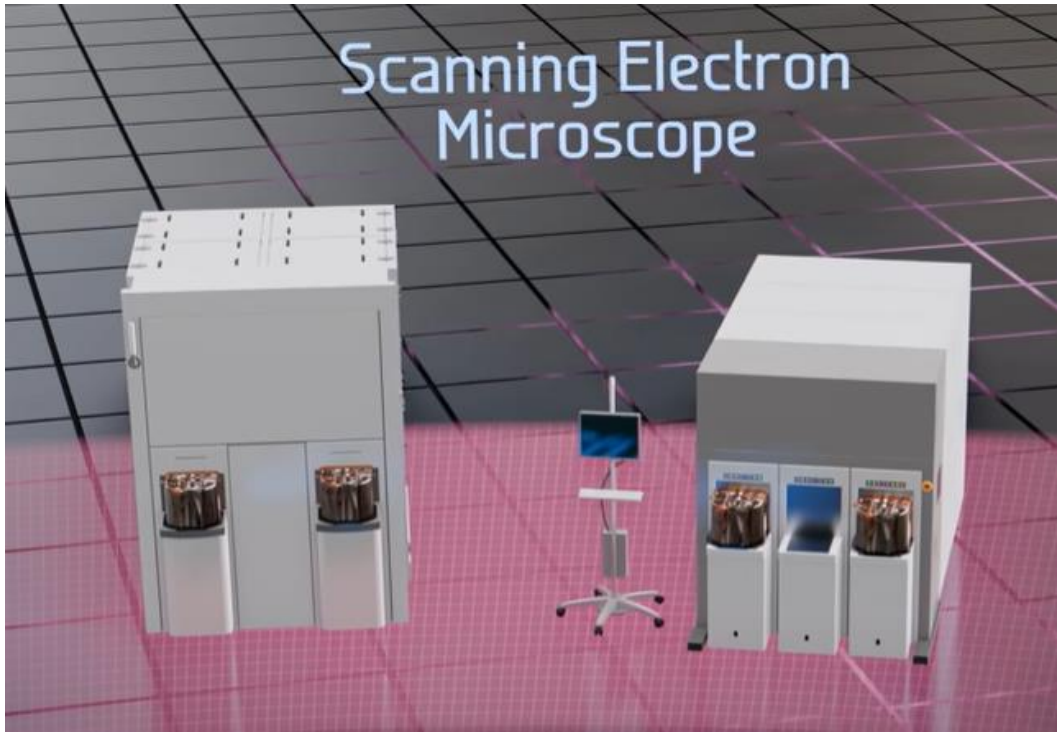

Silicon Growth
Oxide Deposition
Photoresist Spin Coat
Photolithography
Photoresist Develop
Etching
Ion Implantation
Photoresist Removal
Metal Deposition
Wafer Planarization
Cleaning
Wafer Inspection


Photoresist Spin Coater
Photolithography Tool
Developer
Photoresist Stripper

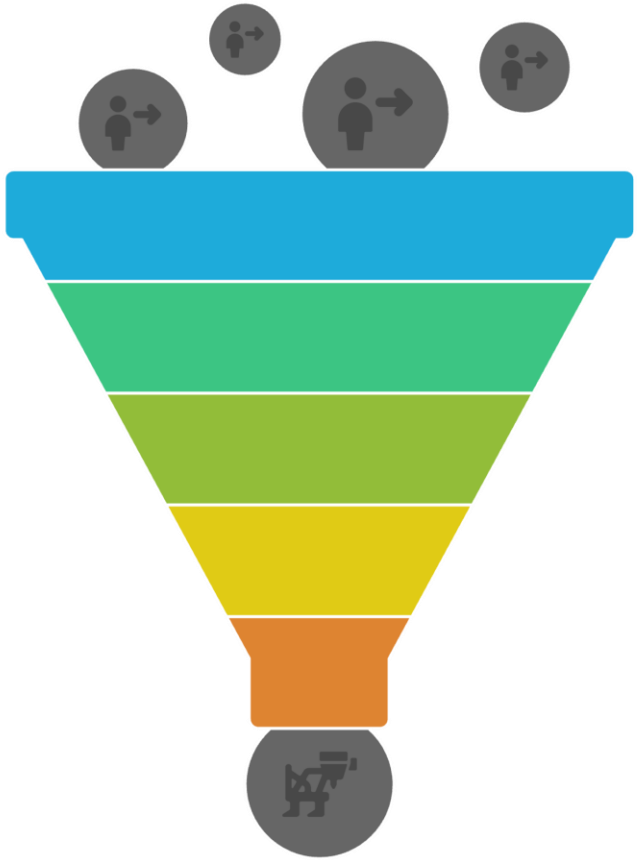

Physical Vapour Deposition
PVD
Chemical Vapor Deposition
CVD
Epitaxial Growth
EPI


Etching Tool
Etching Tool
Dry Etching Tool


Lithography


Scanning Electron
Microscope

Our Expertise- Streamlined Product Facility Setup



End-to-End Setup

Comprehensive facility establishment

Streamline Analysis

Optimizing processes for efficiency

Expert Consultation

Training from scientists and engineers

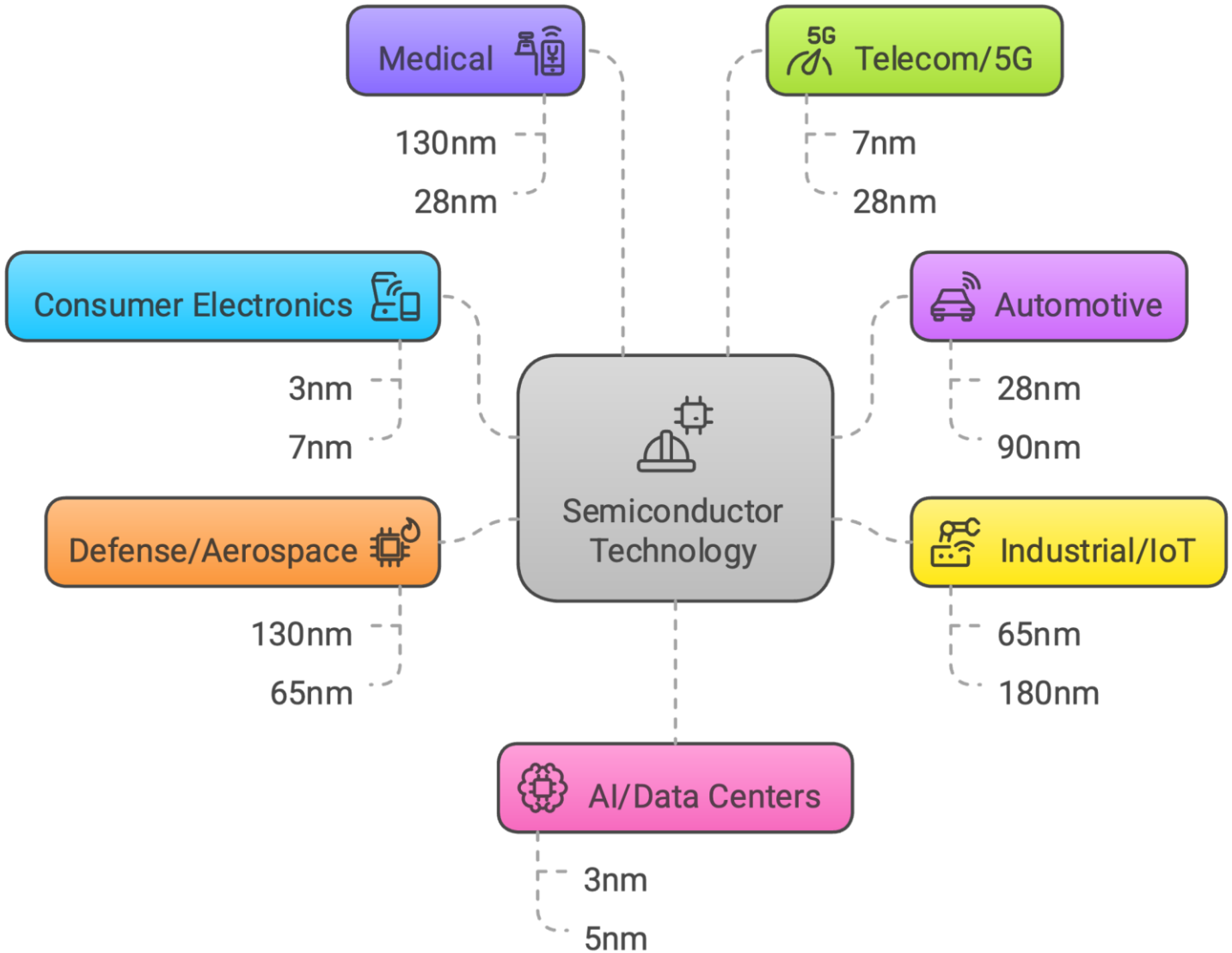
One-Pot Solution

Integrated problem-solving approach

Precision Instruments

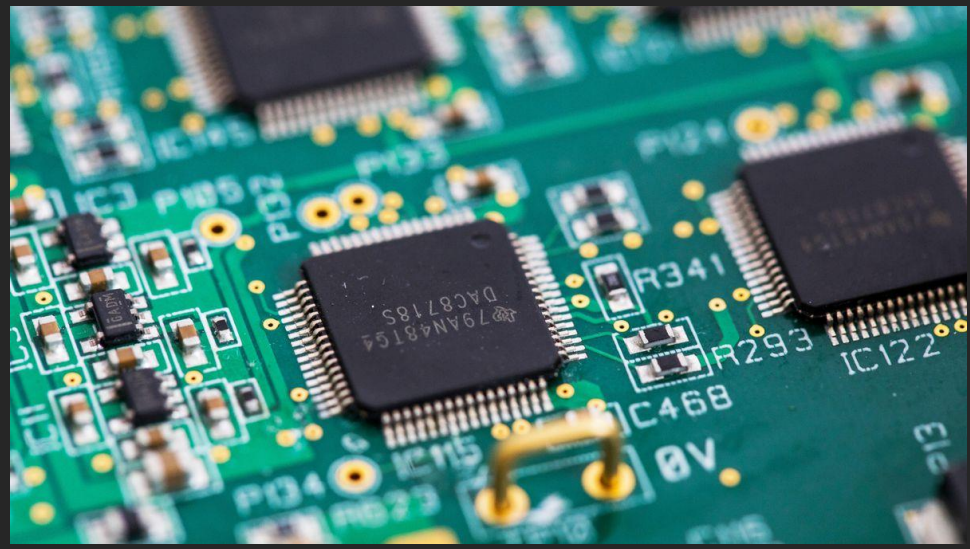
Ensuring high-quality equipment setup

Semiconductor Technology in Various Industries

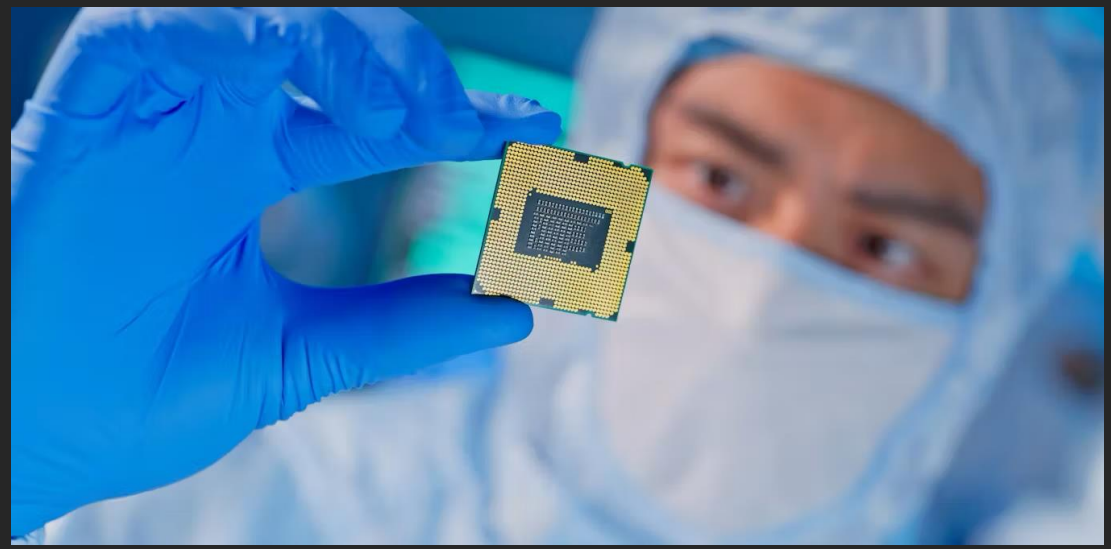


Defense Industry

Aerospace Industry



Consumer Electronics Industry



Medical Industry