Applied Materials Overview
Recognized by IEEE for Patent Quality*

Applied had the best patent quality in the semiconductor equipment manufacturing industry

Applied was #6 of more than 1,000 companies globally

Top 10 Patent Companies

<table>
<thead>
<tr>
<th>Rank</th>
<th>Company/Organization, Country</th>
<th>Industry</th>
<th>2005 U.S. Patents</th>
<th>Pipeline Power</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>MICROELECTRONICS &amp; SYSTEMS CORP, United States</td>
<td>Semiconductor Manufacturing</td>
<td>1538</td>
<td>3396</td>
</tr>
<tr>
<td>2</td>
<td>IBM CORP, United States</td>
<td>Computer Systems and Software</td>
<td>2972</td>
<td>3084</td>
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<tr>
<td>3</td>
<td>HONEYWELL ELECTRONICS INC, United States</td>
<td>Computer Systems and Software</td>
<td>1160</td>
<td>2756</td>
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<tr>
<td>4</td>
<td>INTEL CORP, United States</td>
<td>Semiconductor Manufacturing</td>
<td>1553</td>
<td>2364</td>
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<td>5</td>
<td>BROADCOM CORP, United States</td>
<td>Semiconductor Manufacturing</td>
<td>419</td>
<td>1856</td>
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<td>6</td>
<td>APPLIED MATERIALS INC, United States</td>
<td>Semiconductor Equipment Manufacturing</td>
<td>371</td>
<td>1832</td>
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<td>7</td>
<td>MICROSOFT CORP, United States</td>
<td>Computer Systems and Software</td>
<td>780</td>
<td>1869</td>
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<td>8</td>
<td>DELL TECHNOLOGIES INC, United States</td>
<td>Automotive and Parts</td>
<td>413</td>
<td>1863</td>
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<td>9</td>
<td>ASM INTERNATIONAL BV, Netherlands</td>
<td>Semiconductor Equipment Manufacturing</td>
<td>100</td>
<td>1462</td>
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<tr>
<td>10</td>
<td>HITACHI LTD, Japan</td>
<td>Electronics</td>
<td>1041</td>
<td>1869</td>
</tr>
</tbody>
</table>

*Based on IEEE Spectrum November 2006

www.spectrum.ieee.org
## Patent Comparison Year Over Year

<table>
<thead>
<tr>
<th>IP</th>
<th>FY ’05</th>
<th>FY ’06</th>
<th>% Change YOY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Active U.S. Patents</td>
<td>3,351</td>
<td>3,667</td>
<td>+9%</td>
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<tr>
<td>Active International Patents</td>
<td>1,826</td>
<td>2,152</td>
<td>+18%</td>
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<tr>
<td>Active Global Patents</td>
<td>5,177</td>
<td>5,819</td>
<td>+12%</td>
</tr>
</tbody>
</table>
Applied Materials

- **Our Vision**
  - We apply nanomanufacturing technology to improve the way people live.

- **Our Mission**
  - To be the global leader in nanomanufacturing technology solutions for the electronics industry, through differentiated and innovative system, service and software products, providing our customers a trusted path to superior results.
Applied Materials Products

- Semiconductor
- Display
- Services and Software
- Packaging, Glass and Flexible Electronics
- Solar
Our Products

- The silicon segment is comprised of a wide range of products designed, manufactured and sold for the semiconductor chip market.
- The fab solutions segment is comprised of a broad range of products to maintain and optimize customers' semiconductor fabs, including: spare parts, total parts management, remanufactured equipment, maintenance agreements, total support programs, and environmental and software solutions.
- The display segment represents products which Applied designs, manufactures, sells and services for our customers who fabricate and test flat panel displays (FPDs).
- The adjacent technologies segment consists of products which we design, manufacture, sell and service for customers who fabricate solar cells, flexible electronics and other web products, and energy efficient glass.
Semiconductor Wafer Processing

Manufacturing Automation Software

Manufacture Wafer

Epitaxy

Ion Implantation

Deposition

RTP

Etching

Wafer Cleaning

CD SEM Metrology

Defect Inspection & Review

Assembly, Test

CMP

Mask Etch

Mask Defect Detection

Lithography Technologies

Fab & Equipment Services
Applied Materials Transistor Solutions

- **Stress-inducing Nitride**
  - Applied Producer® Celera™
- **Gate Polysilicon**
  - Applied Centura®
  - Polygen™ LPCVD
- **Spacer**
  - Applied Centura®
  - SiNgenPlus™ LPCVD
- **Source/Drain Extensions**
  - Applied Vantage® RadiancePlus™ RTP
- **Silicon Substrate**
  - Applied Centura® Epi
- **Process Control Systems**
  - Applied UVision™ SP Inspection
  - Applied SEMVision™ G3 HP Defect Analysis
  - Applied SEMVision™ G3 Defect Analysis
  - Applied SEMVision™ G3 FIB Defect Analysis
- **Pre-metal Dielectric**
  - Applied Producer® HARP™
- **Nickel Silicide**
  - Applied Endura®
  - ALPS® Ni PVD
- **Oxynitride Dielectric**
  - Applied Centura®
  - DPNPlus Gate Stack
- **Shallow Trench Isolation**
  - Applied Producer® HARP™
- **Source/Drain Stress-inducing Selective SiGe Epi**
  - Applied Centura® RP Epi
Applied Materials
Copper/Low k Interconnect Solutions

Process Systems
- Applied Producer® Black Diamond®
- Applied Producer® Black Diamond® II
- Applied Producer® BLOk®

- Applied Centura® Enabler® Etch

- Applied Endura® CuBS

- Copper
- Applied SlimCell® ECP

Process Control Systems
- Applied UVision™ SP Inspection
- Applied ComPlus™ 3T Inspection
- Applied SEMVision™ G3 HP Defect Analysis
- Applied SEMVision™ G3 Defect Analysis
- Applied SEMVision™ G3 FIB Defect Analysis
- Applied VeritySEM™ 2 Metrology
Breakthrough Technology

- Industry leader in the development of breakthrough technologies for advanced semiconductor manufacturing
- Extensive product line that covers the majority of chipmaking processes

Single-wafer, Multi-chamber Platform Architecture

- Applied Endura®
- Applied Centura®
- Applied Opus®
- Applied Producer®
- Applied Vantage®
Chemical Vapor Deposition (CVD)

- Materials react on the wafer surface, forming a thin film of solid material
- Used to deposit metal and dielectric films on a wafer for building transistor and interconnect structures
- Systems deposit: silicon oxide, silicon nitride, dielectric anti-reflective coatings, low k dielectric, high k dielectric, aluminum, titanium nitride, tungsten, refractory metals, silicides or other specialty materials

Metal CVD Products:
- Applied Endura® iFill™ Al CVD/PVD
- Applied Centura® iSprint™ Tungsten ALD/CVD
Chemical Vapor Deposition (CVD)

Dielectric CVD Products:

- Applied Producer® PECVD and Applied Producer® GT PECVD
  - Applied Producer® Black Diamond®
  - Applied Producer® Black Diamond® II
  - Applied Producer® BLOk®
  - Applied Producer® DARC®
  - Applied Producer® DARC® 193
  - Applied Producer® APF™
  - Applied Producer® APF™-e
  - Applied Producer® Celera™

- Applied Producer® SACVD®
  - Applied Producer® HARP™

- Applied Centura® Ultima X HDP-CVD®
Thermal Processes

- High temperature systems are used to grow film layers or deposit materials using thermal CVD (single-crystal silicon, poly-crystalline silicon, silicon dioxide, silicon nitride)
- Other thermal processes are used to modify materials (annealing, silicidation, diffusion, oxidation)

Epitaxial Films:
- Applied Centura® Epi
- Applied Centura® RP Epi

Polysilicon Films:
- Applied Centura® Polygen™ LPCVD

Nitridation:
- Applied DPNPlus Gate Stack

Rapid Thermal Processing (RTP):
- Applied Vantage® RadiancePlus™ RTP
- Applied Vantage® RadOx™

Silicon Nitride:
- Applied Centura® SiNgenPlus™ LPCVD

Applied Centura® Epi
Physical Vapor Deposition (PVD)

- Metal atoms are sputtered off of a target, then deposited on the wafer
- Systems deposit aluminum, aluminum alloys, cobalt, copper, nickel, tantalum/tantalum nitride, titanium/titanium nitride, and vanadium

Products:
- Applied Endura® Al Slab PVD
- Applied Endura® Fill Al PVD
- Applied Endura® iFill™ Al CVD/PVD
- Applied Endura® CleanW™ PVD
- Applied Endura® ALPS® Co or Ni PVD
- Applied Endura® iLB™ II PVD/CVD
- Applied Endura® CuBS PVD
- Applied Endura® iCuBS™ ALD/PVD
- Applied Endura® Metal Hardmask PVD
- Applied Endura® UBM & Bondpad PVD
Electrochemical Plating (ECP)

- ECP removes copper atoms from an electrolyte, then deposits them onto the surface of a wafer immersed in the liquid
- ECP systems deposit bulk copper to form interconnect wiring on a chip

Product:
- Applied SlimCell® ECP
Atomic Layer Deposition (ALD)

- ALD deposits sequential individual atomic layers of conducting or insulation material
- Provides uniform surface coverage of nanometer-scale features

**Products:**

- Applied Endura® iCuBS™ ALD/PVD
- Applied Centura® iSprint™ Tungsten ALD/CVD
Etch

- Chemically removes materials from areas on the wafer dictated by the photoresist pattern
- Systems etch dielectric, silicon and metal films

**Dielectric Etch Products:**
- Applied Centura® Enabler® Etch
- Applied Producer® Etch
- Applied Centura® eMAX® Etch

**Silicon Etch Products:**
- Applied Centura® AdvantEdge™ Silicon Etch
- Applied Centura® Mariana™ Trench Etch

**Metal Etch Product:**
- Applied Opus® AdvantEdge™ Metal Etch

**Mask Etch Product:**
- Applied Tetra™ III Advanced Reticle Etch
Chemical Mechanical Polishing (CMP)

- Removes material from a wafer to create a planarized surface
- Flat surface allows subsequent photolithography patterning steps to occur with greater accuracy
- Systems planarize oxide, tungsten, polysilicon, STI and copper films

Products:

- Applied Reflexion® LK CMP
- Applied Reflexion® LK Cu CMP
- Applied Reflexion® LK Ecmp™
- Applied Reflexion® Fixed-Abrasive Web™ CMP
Metrology

- Critical Dimension (CD) Scanning Electron Microscopes (SEMs) use an electron beam to form images of critical features on semiconductor wafers at extremely high magnification
- Magnified features on the chip can be accurately measured to determine their dimensions

Products:
- Applied VeritySEM® 2 Metrology
- Applied RETicleSEM Mask Metrology
Wafer Inspection

- Wafer inspection systems detect defects in devices with design rules of 65nm and below
- Defect Review SEMs (DR-SEMs) review defects such as particles, scratches, open circuit lines, etc. and classify the defect to identify the source
- DR-SEMs with focused ion beam (FIB) provides a cross-sectional view of defects enabling analysis as part of the in-line review process

**Wafer Inspection Systems:**
- Applied ComPlus™ 3T Inspection
- Applied UVision™ SP Inspection

**Defect Review Systems:**
- Applied SEMVision™ G3 HP Defect Analysis
- Applied SEMVision™ G3 Defect Analysis
- Applied SEMVision™ G3 FIB Defect Analysis
Wafer Wet Clean

- Advanced cleaning efficiency, chemistry and system architecture
- Applications include nearly 100 critical cleaning steps in fabricating the transistor area of the chip
- System provides significantly faster production cycle time and superior particle removal performance

**Product:**
- Applied Oasis Clean™
Global Services

- Applied Global Services™ provides integrated service solutions for semiconductor, mask, display and solar fabs around the world

- Applied Equipment Productivity Services
- Applied Fab Operations Services
- Applied Equipment Renewal Services
  - Refurbishment
  - System Enhancements
- Applied Manufacturing Automation Services
Manufacturing Automation Services

- Leading supplier of Manufacturing Execution Systems (MES) software and fab management and automation solutions
  - Automated factory information and control solutions monitor and control real-time fab manufacturing including process, quality, equipment and recipe management

Products:
- Applied FAB300®
- Applied NeXus™
- Applied NeXus™ SPC
- Applied WorkStream®
Fab Operations Services

- Metron Technology, Inc., a subsidiary of Applied Materials, supplies fab-wide operations support services to the semiconductor and related industries

Products:
- Chamber performance services
- Abatement systems and pump products
- Gas and fluid handling
- Specialty equipment
EcoSys® Environmental Solutions

- Suite of treatment systems to address the full spectrum of semiconductor abatement applications
- Energy saving solutions that enable chipmakers worldwide to meet their most stringent environmental goals

Abatement Technologies:
- CDO™
- Litmas™
- Guardian™
- Marathon™
- Novapure™
- Vector®

Energy-Saving Vacuum Pumps

EcoSys® Marathon
Thermal-Wet Abatement
Flat Panel Display Manufacturing Systems

PECVD Systems

- PECVD systems deposit doped and undoped amorphous silicon, silicon nitride, silicon oxide and oxynitride
- PECVD systems deposit films on glass substrates more than 70 times larger than 300mm wafers

AKT PECVD Systems:
- AKT-1600 PECVD (400mm x 500mm)
- AKT-3500 PECVD (550mm x 650mm)
- AKT-4300 PECVD (620mm x 750mm)
- AKT-5500 PECVD (730mm x 920mm)
- AKT-10K PECVD (1,000mm x 1,200mm)
- AKT-15K PECVD (1,200mm x 1,300mm)
- AKT-20K PECVD (1,300mm x 1,500mm)
- AKT-25K PECVD (1,500mm x 1,850mm)
- AKT-40K PECVD (1,950mm x 2,250mm)
- AKT-50K PECVD (2,160mm x 2,460mm)
- AKT-55K PECVD (2,200mm x 2,500mm)
Flat Panel Display Manufacturing Systems

E-Beam Array Testers

- E-Beam Array Testers provide fast, cost-effective ways to find and identify defective pixels on large-area substrates

AKT E-Beam Array Testers:
- AKT-1600 EBT (360mm x 465mm)
- AKT-3500 EBT (550mm x 650mm)
- AKT-4300 EBT (620mm x 750mm)
- AKT-5500 EBT (730mm x 920mm)
- AKT-15K EBT (1,200mm x 1,300mm)
- AKT-25K EBT (1,500mm x 1,850mm)
- AKT-40K EBT (1,950mm x 2,250mm)
- AKT-55K EBT (2,200mm x 2,500mm)
Flat Panel Display Manufacturing Systems

Color Filter Sputtering Systems

- Color Filter Sputtering systems deposit conductive and reflective film on color filter substrate for flat panel display

**AKT New ARISTO™ Sputter Systems:**

- AKT-NEW ARISTO™ 1200 (1100mm x 1200mm)
- AKT-NEW ARISTO™ 1200L (1200mm x 1600mm)
- AKT-NEW ARISTO™ 1400 (1250mm x 1300mm)
- AKT-NEW ARISTO™ 1400L (1400mm x 1600mm)
- AKT-NEW ARISTO™ 1800 (1500mm x 1850mm)
- AKT-NEW ARISTO™ 1800L (1870mm x 2200mm)
- AKT-NEW ARISTO™ 2200S (1950mm x 2250mm)
- AKT-NEW ARISTO™ 2200M (2250mm x 2500mm)
Solar Photovoltaic Cell Manufacturing Systems

- Systems designed to enable customers to increase cell conversion efficiency and yields
- Goal is to help lower the cost per watt of solar electricity

Products:
- ATON™
Glass Coating Products

- Sputter technology deposits a variety of target materials onto glass substrates
- Flexible systems designed to enable customers to configure the coating system to match their evolving production needs
- Technologically advance components to increase yield and lower cost per m²
- Excellent maintenance package for longer uptime

Coating System:
- Applied AXL 870™ Compartment Coater

Components:
- C-MAG® Rotatable Magnetron
- VAC-MAG® Endblocks
- X-BAR™ Magnet Assembly
Web Coating Products

- Roll-to-roll technology capable of coating PET, BOPP, PPS, PEN, PI, OPP, PVC, nylon and paper substrates
- Various process capability; sputter process, evaporation and metallization
- Wide variety of packaging applications such as food packaging, labels, gift wrap, security films and window films
- Wide variety of applications in flexible electronics such as film capacitors, medical sensors, FPCBs, RFID, to flexible solar cells and displays

Products:
- MULTIMET™
- MULTIWEB™
- SMARTWEB™
- TOPBEAM™
- TOPMET™
Technology Development Facility
Maydan Technology Center (MTC)

- Simulates customers’ fab environment with a full complement of chipmaking technologies
- Process integration capabilities helps customers bring new chip technologies to market faster
- Supports process and equipment development beyond the 45nm node
- 166,000 square foot facility focused on 300mm development with 39,000 square feet of Class 1* open cleanroom space

* ISO Class 3
think it. apply it.