

# *High-Risk Technology Development*

*Co-Funded  
by*

*The Advanced Technology Program (ATP)*

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**NIST**  
National Institute of  
Standards and Technology  
Technology Administration  
U.S. Department of Commerce

# *ATP is part of NIST*

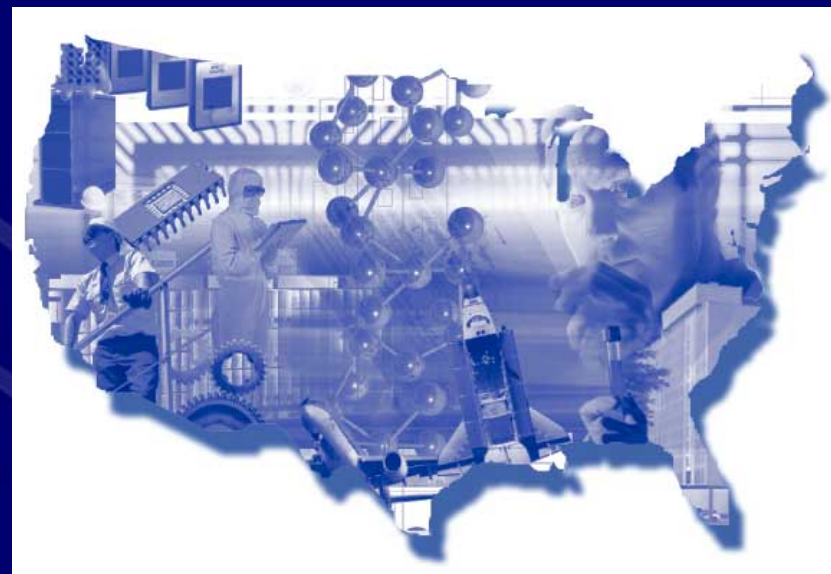
**NIST's mission** is to develop and promote measurement, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life.

## **NIST Assets Include:**

- 3,000 employees
- 1,600 associates
- \$825 million FY 2003 operating budget
- NIST Laboratories
- Advanced Technology Program
- Manufacturing Extension Partnership
- Baldrige National Quality Award



*To accelerate the development of  
innovative technologies for broad  
national benefit through  
partnerships with  
the private sector.*



# *Key Features of the ATP*

- Focuses on the civilian sector
- Focuses on enabling technologies with high spillover potential
- Focuses on overcoming difficult research challenges
- Encourages company-university-laboratory collaboration
- Positioned after basic science and before product development

# *Examples of Projects in Microlithography and Related Technologies*

- **Lithography**
- **Front-End Processes**
- **Defect Inspection**
- **Environment, Safety, & Health**
- **Metrology**

## **Development and Demonstration of a Multiple, High-Current-Density Shaped E-Beam Column With Independent Vector Beam Placement**

**Multibeam Systems, Inc., Santa Clara, CA 95054**

**Announced: September 2004**

**Total project budget: \$2,707 K/ ATP funds \$1,999 K**

## **Nano-Imprint Lithography Infrastructure for Low Cost Replication at the 65 nm node and Beyond**

**Molecular Imprints, Inc., Austin, Texas**

**Participants: Motorola, Inc. Motorola Labs (Tempe, AZ), Photronics, Inc. (Brookfield, CT) KLA-Tencor Corporation (Milpitas, CA), University of Texas at Austin (Austin, TX)**

**Announced: May 2004**

**Total project budget: \$.): \$36,790 K/ ATP funds \$17,623 K**

## **Intelligent Mask Inspection System for Next-Generation Lithography**

**KLA-Tencor Corporation, San Jose, CA**

**Other Participants: DuPont Photomask, Inc. (Round Rock, TX), EUV LLC (Livermore, CA.),**

**Photronics, Inc. (Jupiter, FL); Motorola Labs,( Tempe, AZ)**

**Announced: October 1998**

**6 Total project budget: \$43,355 K / ATP funds \$18,912 K**

# *Lithography Continued*

## **Intelligent Control of the Semiconductor Patterning Process**

**KLA-Tencor Corporation, San Jose**

***Other participants: FSI International (Allen, Texas); Lam Research Corp. (Fremont, Calif.); Stanford University***

***(Stanford, Calif.), University of Michigan, (Ann Arbor, M.I.); the University of California at Berkeley, the University of California at Irvine***

**Announced: October 1998**

**Total project budget: \$18,292 K / ATP funds \$9,110 K**

## **Development of a Short Wavelength Pattern Generator**

**Etec Systems, Inc., Hayward, Calif.**

**Announced: October 2000**

**Total project budget: \$5,709 K (est.) / Requested ATP funds: \$2,000 K (est.)**

## **Achromatic Fresnel Optic for EUV and X-ray Radiation:**

**An Innovative Camera Concept for Next Generation Lithography**

**Xradia, Inc., Concord, Calif.**

**Announced: November 2002**

**Total project budget: \$2,665 K (est.) / Requested ATP funds: \$2,000 K (est.)**

# *Front-End Processes*

**Contact Planarization for Microlithographic Processes**

**Brewer Science, Inc., Rolla, Mo.**

**Announced: October 2001**

**Total project budget: \$3,496 K (est.) / Requested ATP funds: \$2,000 K (est.)**

**Early Prototype Non-Gallium Ion Beam for Lithography and Wafer Manufacturing**

**FEI Company, Micrion Division (formerly Micrion Corp.), Hillsboro, OR**

**Announced: October 1998**

**Total project budget: \$2,309 K / ATP funds \$1,582 K**

**Gas-Cluster Ion-Beam Manufacturing Tool for Next-Generation Semiconductor Devices**

**Epion Corp of JDS Uniphase Corporation (formerly Epion Corporation), Billerica, MA**

**Announced: October 1998**

**Total project budget: \$4,137 K/ ATP funds \$ 2,000 K**

# *Defect Inspection*

## **Advanced Wafer Inspection for Next-Generation Lithography**

**KLA-Tencor Corporation, San Jose, Calif.**

***Other Participants: Carnegie-Mellon University (Pittsburgh, P.A.); Tropel Corporation, (Fairport, N.Y.)***

**Announced: October 2000**

**Total Project budget: \$13,720 K (est.) / Requested ATP funds: \$6,717 K (est.)**

## **Digital Holographic Inspection of Semiconductor Devices**

**nLine Corporation, Austin, Texas**

***Other Participants: InterScience, Inc. (Troy, N.Y.); Light Age, Inc. (Somerset, N.J.); Sarnoff Corporation, (Princeton,***

***N.J.); Oak Ridge National Laboratory, (Oak Ridge, TN)***

**Announced: October 2000**

**Total project budget: \$19,175 K (est.) / Requested ATP funds: \$9,396 K (est.)**

## **Spintronics-Based High-Resolution, Non-Invasive, and Ultrafast Metrology for the Semiconductor Industry**

**Micro Magnetics, Inc., Fall River, MA**

**Announced: September 2003**

**Total project budget: \$3,406 K (est.) / Requested ATP funds: \$ 2,000 K (est.)**

**Develop a nanoscale magnetic tunnel junction current-sensing system for integrated circuit inspection that will help maintain the U.S. lead in semiconductors by providing vastly improved metrology for in-process inspection.**

## **Advanced Technology for Non-destructive, Localized, Dielectric Metrology of Future Generation Integrated Circuits**

**Neocera, Inc., Beltsville, Maryland**

**Announced: 2002**

**Total project budget (est.): \$3,378 K / ATP funds \$1,968 K**

**Develop microwave metrology technology for quantitative in-situ characterization of materials with low dielectric constants at length scales and frequencies appropriate to future integrated circuit designs.**

## **ACIM "Point\*Suns": Concentrating Energy Through Silent Sound and Clean Water Uncopiers, Inc., Manhattan, Kan.**

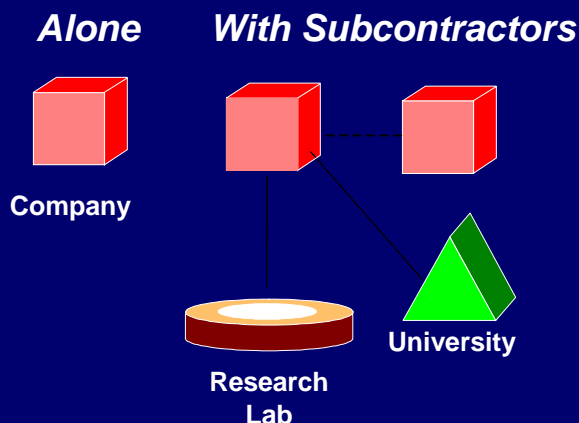
Announced: August 2001

Total project budget: \$2,311 K (est.) / Requested ATP funds: \$2,000 K (est.)

Design and build an energy-efficient, chemical-free nanoparticle detector and wafer cleaner to enable the semiconductor industry to clean and inspect next-generation wafers reliably and profitably -- locating a nanoparticle on a wafer is equivalent to finding a specific grain of sand on a baseball field.

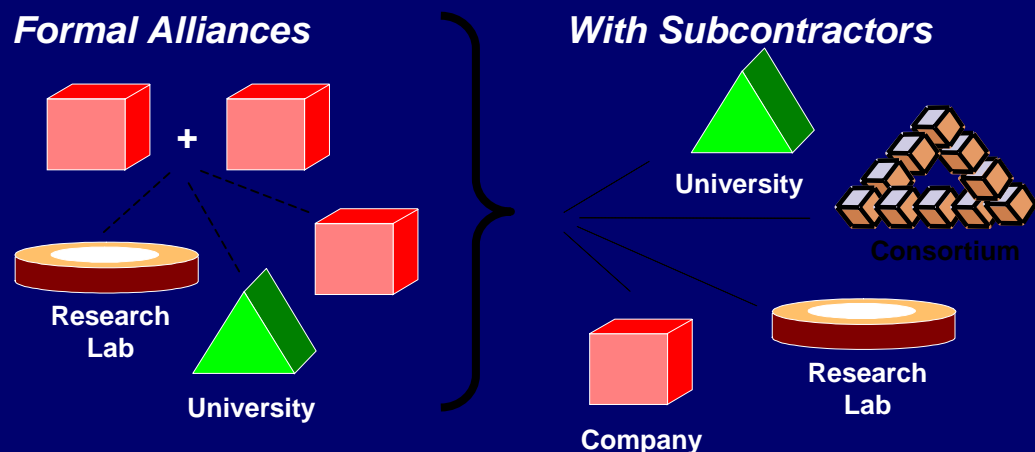
# Two Ways to Apply

## As a Single Company



- **For-profit company**
- **3-year time limit**
- **\$2M award cap**
- **Company pays indirect costs**
- **Large companies cost share at least 60% of total project cost**

## As a Joint Venture



- **At least two for-profit companies**
- **5-year time limit**
- **No limit on award amount (other than availability of funds)**
- **Industry share >50% total cost**

- **ATP encourages teaming arrangements**
- **Most projects involve alliances**

# *Two Major Criteria*

- **Scientific and Technological Merit (50%)**
  - **Technical Rationale**
    - Technological Innovation
    - High Technical Risk & Feasibility
  - **R&D Plan**
- **Potential for Broad-Based Economic Benefits (50%)**
  - **National Economic Benefits**
  - **Need for ATP Funding**
  - **Pathway to Economic Benefits**

# *For Information on ATP and to Join Our Mailing List . . .*

- Call toll-free: **1-800-ATP-FUND  
(1-800-287-3863)**
- Fax your name and  
address to: **301-926-9524**
- Send e-mail to: ***atp@nist.gov***
- Visit ATP's website: ***www.atp.nist.gov/***