



Introduction to ATP Projects in Organic Electronics

Dr. Michael Schen, Program Manager
Electronics and Photonics Technology Office
Advanced Technology Program
Ph: (301) 975-6741 E-mail: michael.schen@nist.gov

<http://www.atp.nist.gov/epto>

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



ATP's Aim

- Promote market-driven, technology integration
- Catalyze vertical and horizontal partnerships between American supplier and user companies
- Address high technical risk problems that span multiple organizations and disciplines
- Fund companies that are the innovators of tomorrow's electronics industry

*Stimulate joint venture and single applicant
proposals that meet these goals*

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



OET-related Awards

- 18 OET-related Awards since 1991
- \$159.9 M total R&D
 - \$82.2 M industry
 - \$77.7 M ATP
- Involving
 - 34 companies
 - 2 industry consortia
 - 3 universities
 - 1 gov't laboratory
 - plus subcontractors



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



EPTO Projects To Date in Organic Electronics

- ***Interconnection***
7 Awards: \$62.9 M Total / \$29.1 M ATP
- ***Memory***
2 Awards: \$34.2 M Total / \$16.8 M ATP
- ***Power***
4 Awards: \$30.7 M Total / \$15.1 M ATP
- ***Display / Illumination***
4 Awards: \$28.4 M Total / \$14.9 M ATP
- ***Sensors***
1 Award: \$3.8 M Total / \$1.7 M ATP



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



Ongoing OE Projects

For further information on each, visit the ATP website

Interconnection

- **Ultra-Low Dielectric Constant Materials for Integrated Circuit Interconnects**, Dow Chemical Company, Midland, MI

Participants: IBM Almaden Research Center

Award Date: October 1998 / Project duration: 3 years

Total project (est.): \$17,606 K / Requested ATP funds: \$8,557 K

Develop and test new high-performance integrated-circuit insulation materials based on nanoporous polymeric materials and evaluate their suitability for long-term use through several future generations of high-density chips as feature sizes shrink and the demands on the dielectric get tougher.

- **Advanced Embedded Passives Technology Consortium**, NCMS, Ann Arbor, MI

Participants: 3M Co., Compaq Computer Corp., Delphi, Dupont Photopolymer & Electronic Materials, Dupont High Performance Films, ESI, Interconnect Technology Research Institute, HADCO Corporation, MacDermid Inc., Merix Corp., MicroFab, Northern Telecom Inc., Nu Thena Systems Inc., Ormet Corp.,

Award Date: October 1998 / Project duration: 4 years

Total project (est.): \$16,107 K / Requested ATP funds: \$7,805 K

Develop the materials, manufacturing techniques, and design tools necessary for embedding the majority of passive electrical devices--resistors and capacitors--into the structure of the circuit board, thus reducing costs and space requirements and improving reliability and performance of a wide class of electronic devices.



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



Ongoing OE Projects

For further information on each, visit the ATP website

Interconnection (cont.)

- **Optical Polymers and Manufacturing Processes for Low-Cost WDM Devices and Systems**, Lightwave Microsystems, Santa Clara, CA

Participants: BFGoodrich Specialty Chemicals

Award Date: October 1998 / Project duration: 3 years

Total project (est.): \$10,363 K / Requested ATP funds: \$5,098 K

Develop new materials, device structures, and fabrication processes for low-cost manufacturing of integrated photonic assemblies, leading to substantial cost reductions and performance advantages in wavelength division multiplexed fiber-optic networks.

Power

- **Advanced Rechargeable Lithium Polymer Sulfur Batteries**, PolyPlus Battery Company, Berkeley, CA

Participants: Eveready Battery Company, Inc., Sheldahl, Inc.

Award Date: October 1999 / Project duration: 2 years

Total project (est.): \$7,835 K / Requested ATP funds: \$3,819 K

Develop and test rechargeable, long-life lithium-sulfur batteries offering increased energy density, reduced size and manufacturing cost, and enhanced safety, thereby boosting power sources for mobile technologies such as laptop computers and cell phones.



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



Ongoing OE Projects

For further information on each, visit the ATP website

Power

- **Advanced Lithium Solid Polymer Battery Development**, Ultralife Batteries, Inc., Newark, NY
Participants: Eagle-Picher Technologies, LLC, Lockheed Martin Missiles & Space
Award Date: October 1998 / Project duration: 3.0 years
Total project (est.): \$15,263 K / Requested ATP funds: \$7,263 K
Develop lithium-ion solid polymer batteries with twice the energy-carrying capacity of present batteries, potentially giving the United States the lead in the market for batteries to power portable electronic products and space vehicles.
- **Advanced Materials and Processes for Cost-Effective High-Power Ultracapacitor Modules**, Maxwell Energy Products, Inc., San Diego, CA
Award Date: October 1998 / Project duration: 1.83 years
Total project (est.): \$4,219 K / Requested ATP funds: \$2,000 K
Develop new materials and device designs to improve the performance and reduce the costs of ultracapacitors, which could save U.S. industry billions of dollars in lost productivity, reduce fuel consumption in vehicles, and extend the life of electronic devices.



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



Ongoing OE Projects

For further information on each, visit the ATP website

Power (cont.)

- **Higher Voltage, Lower Impedance Aerogel Ultracapacitor**, PowerStor Corp., Dublin, CA
Award Date: October 1998 / Project duration: 2.0 years
Total project (est.): \$3,354 K / Requested ATP funds: \$2,000 K
Radically improve ultracapacitors with new aerogel carbon electrodes to enable development of the next generation of personal computers and portable telecommunication devices.

Display / Illumination

- **Improved Materials Performance for Market Penetration of Crossed Beam Volumetric Displays**, 3D Technology Laboratories, Inc., Sunnyvale, CA
Award Date: October 1998 / Project duration: 3 years
Total project (est.): \$2,222 K / Requested ATP funds: \$1,922 K
Develop a fundamentally new class of optical materials, along with a software development environment, to reduce the cost, improve the performance, and provide application software for crossed-beam volumetric displays, which can be used to visualize three-dimensional data.



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



Ongoing OE Projects

For further information on each, visit the ATP website

Display / Illumination

- Tailored Optical Polymers Through a Novel Catalyst System (TOPCAT)**, BFGoodrich Company, Brecksville, OH
 Participants: 3M Company
 Award Date: October 1995 / Project duration: 5 years
 Total project (est.): \$15,958 K / Requested ATP funds: \$7,899 K
 Develop new catalysis system for making cyclic olefin (optical) polymers for flat-panel displays, and demonstrate component fabrication.

Sensors

- Integrated MEMS Reactor Gas Monitor Using Novel Thin Film Chemistry for the Closed Loop Process Control and Optimization of Plasma Etch and Clean Reactions in the Manufacturing of Microelectronics**, ATMI, Inc., Danbury, CT
 Award Date: September 1999 / Project duration: 3 years
 Total project (est.): \$3,774 K / Requested ATP funds: \$1,711 K
 Develop novel in-process gas sensors for the etching stage of semiconductor wafer manufacture, enabling more efficient, lower emission processing in the next generation of semiconductor fab lines.



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



Who We Are

EPTO Technical Managers

Philip Perconti	optoelectronics optics technologies	(301) 975-4263	philip.perconti@nist.gov
John Albers	microelectronics	(301) 975-2075	john.albers@nist.gov
Gerald Ceasar	power technologies	(301) 975-5069	geraldceasar@nist.gov
Carlos Grinspon	optoelectronics optics technologies	(301) 975-4448	carlos.grinspon@nist.gov
Thomas Lettieri	optics technology optoelectronics	(301) 975-3496	thomas.lettieri@nist.gov
Purabi Mazumdar	microelectronics	(301) 975-4891	purabi.mazumdar@nist.gov
Michael Schen	microelectronics organic electronics	(301) 975-6741	michael.schen@nist.gov
Elissa Sobolewski	RF electronics	(301) 975-3620	elissa.sobolewski@nist.gov

www.atp.nist.gov/epto



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