

Development of New Knowledge and Early Commercial Products and Processes

Advanced Materials and Chemicals | Biotechnology | Electronics/Computer Hardware/Communications | Information Technology | Manufacturing

Table A1. Advanced Materials and Chemicals (Chapter 2)

Awardee Name (A)	Technology Developed (B)	Product or Process Commercialized (C)
AlliedSignal, Inc.	Near-net-shape gelcasting process that is safer and less costly than conventional gelcasting based on acrylamide, a cumulative neurotoxin - demonstrated by making structural ceramic parts for very high-temperature applications.	Commercialization likely.
BioTraces, Inc.	Multiphoton detection (MPD) technology—demonstrated in enhanced immunoassay, chromatography and nucleic acid analysis	Licensee PetroTraces: applications of the technology in the petrochemical field. Marketed directly by BioTraces: ssMPDTM, for clinical diagnostics applications.
Geltech Inc.	Room temperature net-shape gelcasting method—demonstrated in the production of high-quality, silica glass micro-optics.	Materials processing and mold fabrication methods used to develop a porous-glass product which is a component of a home sensor for toxic gases.
IBM Corporation	Nonlinear optical polymeric waveguides—demonstrated in the development of inexpensive optoelectronic switches for computers and communications systems.	Commercialization not likely.
IBM Corporation	Low-polymer foams—demonstrated as potentially feasible for microelectronics insulators.	Commercialization not likely until follow-on research takes it further.
Michigan Molecular Institute	Fundamentals of polymer compatibilization—targeted at demonstrating that mixed plastics (either from waste streams or virgin) can be successfully combined into materials with high performance characteristics.	Prefabricated wall units using plastic panels made compatible, made by Eagle Plastics Systems of Florida in collaboration with University of Florida researchers.

Awardee Name (A)	Technology Developed (B)	Product or Process Commercialized (C)
Westinghouse and SGS Tools	Higher power hot cathode plasma torch technology and integrated gas recycling process technology	Commercialization likely by a newly formed company.

Table A2. Biotechnology (Chapter 3)

Awardee Name (A)	Technology Developed (B)	Product or Process Commercialized (C)
Aastrom Biosciences, Inc.	Bioreactor technology for expansion of stem and other cells outside the patient's body—used in tests and clinical trials for more than 60 cancer patients.	Commercialization likely.
Amersham Pharmacia Biotech	Reengineering of thermophilic enzymes and methods for isolation and genomic characterization of hyperthermophiles from deep-sea vents.	ThermoSequenase, DNA polymerase for DNA sequencing.
Aphios Corporation	Viral deactivation procedures based on critical fluid technology—demonstrated in cleaning contaminated blood supplies.	Commercialization possible.
Integra LifeSciences	A scaleable process for manufacturing A new bioabsorbable polymer.	Tyrosorb Synthetic Polymers, a new material for making implantation devices for musculoskeletal surgical applications in clinical trials.
Molecular Simulations, Inc.	Incorporation of density functional theory (DFT) into easy-to-use software—targeted toward the clinical and biotechnology communities for calculating molecular structures and energies.	Enhanced Turbomole™, a software tool that enables researchers to design new target molecules for drugs and other substances at much lower costs.
Thermo Trilog Corporation	Genetic engineering processes—demonstrated in the production of pyrethrin, a natural insecticide that is nontoxic to mammals.	Commercialization not likely.
Tissue Engineering, Inc.	Techniques and procedures for enhancing tissue growth, including processing tissue, extracting and storing collagen, and spinning and weaving collagen fibers into fabrics for rebuilding lost tissues—demonstrated in production of human prostheses.	Commercialization likely.

Table A3. Electronics/Computer Hardware/Communications (Chapter 4)

Awardee Name (A)	Technology Developed (B)	Product or Process Commercialized (C)
Accuwave Corporation	A process for producing photorefractive materials based on holographic technology—demonstrated in fiber Optics telecommunications applications.	Wavelength division multiplexing components; wavelength controllers, wavelength lockers and fiber-optic collimators.
American Display Consortium	Tape Automated Bonding (TAB) process for mounting ICs on a display surface	TAB process used in production
AstroPower, Inc.	Improved liquid-phase epitaxial growth methods and a high-throughput manufacturing technology—demonstrated in the fabrication of high-performance optoelectronic devices such as ultra-bright light-emitting diodes (LEDs).	New epitaxy technology incorporated in all company production processes, including the Silicon-Film™ solar cell.
Calimetrics, Inc.	Pit Depth Modulation and Multilevel Technology	Licensed for commercialization
Cree Research, Inc.	Methods for increasing the quality and size (to two inches or more) of silicon carbide single crystals—demonstrated in the fabrication of LEDs and other electronic and optoelectronic devices.	Less expensive blue light-emitting diodes, and improved silicon carbide wafers that permit fabrication of electronic devices that deliver more power, last longer, and can withstand very high temperatures.
Cynosure, Inc.,	A fault-tolerant optical system—demonstrated for a diode-laser array in a laser surgical application.	Commercialization possible.
Diamond Semiconductor Group, LLC	Compact high-current broad beam ion—implantation technology for altering the electrical properties of materials—enabling production of larger semi-conductor wafers and also useful for other applications.	A new high-current ion implanter, produced by Varian Associates, which incorporates the new techniques developed in the ATP project for implanting dopants on large silicon crystal wafers measuring 300 mm or more in diameter.
ETOM Technologies, Inc.	Techniques for writing and reading more than one bit of information at the same spot of an optoelectronic disk, and new optoelectronic disk materials.	Commercialization not likely.
FSI International, Inc.	A dry gas wafer cleaning method—demonstrated in the cleaning of computer-chip wafers during manufacturing (which traditionally has used wet chemical processing), and suitable for the ever smaller features on new generations of chips.	Commercialization possible.
Hampshire Instruments, Inc. (Joint Venture)	Techniques for laser pumping of high-power laser systems—demonstrated using a laser-diode array to pump a neodymium-doped gadolinium gallium garnet laser for producing low-cost x-rays.	Commercialization not likely.

Awardee Name (A)	Technology Developed (B)	Product or Process Commercialized (C)
Light Age, Inc.	Broadly tunable laser source of ultraviolet (UV) light based on alexandrite laser technology—aimed at applications in science, medicine, and photolithography.	Three laser products - nUVo™, PAL/UV™, and PAL/PRO™ - for laser surgery and potentially for other applications, including next-generation chip fabrication and investigation of weather conditions in the upper atmosphere (70 miles above earth).
Lucent Technologies, Inc.	Fabrication, testing, and alignment techniques for extremely precise aspherical, multilayer-coated mirrors—essential for extreme ultraviolet (EUV) technology, a contender for future lithography systems.	Subcontractor Tinsley Laboratories: application of improved fabrication methods learned in the project to all its aspherical mirror production. Subcontractor Tropel: a specialized interferometer it now uses in other contract work. Commercialization possible for lithography systems.
Multi-Film Venture (Joint Venture)	Procedures for interconnecting thin-film integrated circuits—targeted at complex, multi-film module (MFM) electronic device applications and suitable for use when the films are arranged either side by side for flat-panel displays or in layers for compact processor units.	Commercialization possible.
NCMS (Joint Venture)	Advanced processes for making printed wiring boards.	Single-ply fiberglass boards; thin copper plating; test procedures; plasmas monitoring device; imidazole treatment.
NetOptix Corp (formerly Galileo)	New processes for fabricating micro-channel plates (MCPs) using photon detectors and other types of electron multipliers—demonstrated in night vision applications.	Commercialization possible.
Nonvolatile Electronics, Inc.	New procedures that enhance the producibility, circuit density, and signal strength of giant magneto-resistance (GMR) materials—demonstrated in random access memory (RAM) and highly sensitive sensor applications.	Highly sensitive sensors based on giant magneto-resistance materials that could be used in brakes, pacemakers, and many other applications.
Spire Corporation	Feedback-controlled, chemical vapor deposition processes—demonstrated in a reactor in a high-throughput mode for fabricating low-cost, high-quality metallo-organic laser diode arrays and other optoelectronic devices.	A prototype reactor being used for limited production of epitaxial wafers.
Thomas Electronics, Inc.	A high-efficiency electron source to enable development of new classes of efficient, bright, flat fluorescent lamps—with wide applications in computer and instrument displays and in high-definition TV screens.	Prototypes and pilot models of flat fluorescent lamps placed with more than a dozen companies for further evaluation and field testing of the new technology in cockpit and other applications.
Vitesse Semiconductor	GaAs design innovations.	H-GaAs IV-based transceivers and ATE.

Table A4. Information Technology (Chapter 5)

Awardee Name (A)	Technology Developed (B)	Product or Process Commercialized (C)
Communication Intelligence Corporation #1	New data-entry software technology that recognizes each user's natural handwriting without "training" the computer of the user—intended to allow a pen and tablet to be used instead of a keyboard.	Enhanced Handwriter(r)MXTM—a stylus-and-pad system that recognizes hand-printed text.
Communication Intelligence Corporation #2	A recognition system for hand-written Chinese —Intended to replace a cumbersome data-entry system that uses a keyboard.	Commercialization likely.
Engineering Animation, Inc.	Core algorithms to enable the creation of 3D images from sets of 2D cross-sectional images, with an initial application targeting animated visualization of the entire human body.	Three CD-ROMS (The Dissectible HumanTM, The Dynamic HumanTM, and CardioViewer 3DTM), plus two medical textbooks that are used to train medical personnel.
Mathematical Technologies, Inc.	Mathematical methods for managing successive digitized video images—with the purpose of removing defects from one or more individual frames of new or archived movies.	Digital Restoration Services™, integrated into post-production movie processing at a number of facilities in the entertainment industry.
Torrent Systems, Inc.	Component-based software and user interface for building parallel processor applications—a tool for the professional programmer.	Orchestrate™ - an innovative component software prototype system that enables a variety of hardware systems to handle massive amounts of data and increase processing efficiency.
Union Switch and Signal, Inc.	Distributed Multi-agent-based optimization technology.	"Real-time Control Traffic Controller" and "Offline Railroad Operations Planner" in testing for possible commercialization.

Table A5. Manufacturing (Chapter 6)

Awardee Name (A)	Technology Developed (B)	Product or Process Commercialized (C)
American Superconductor Corporation	Wire fabrication and winding techniques for high-temperature superconducting materials, with primary applications in the development of extremely efficient large motors.	CryoSaver™—electrical wires that carry current into and out of cryogenically cooled devices, which reduces electrical resistance and helps users achieve better operating efficiencies.
Armstrong World Industries, Inc.	Process technology for controlling the microstructure of aerogel insulation materials —targeted toward cost-effectively enhancing its thermal insulating properties.	Commercialization possible through licensing.

Awardee Name (A)	Technology Developed (B)	Product or Process Commercialized (C)
Auto Body Consortium (Joint Venture)	Measurement and process control technology—demonstrated in reduction of dimensional variation in auto body assembly to two millimeters or less.	New measurement and process control systems in auto assembly plants that cut dimensional variation to a world-class standard of two millimeters and below, being implemented in 22 assembly plants in the United States and Canada.
E.I. Dupont de Nemours & Company	Thin-film fabrication processes for high-temperature superconducting materials—targeted toward low-cost electronics components.	New thin-film components, incorporated into magnetic resonance imaging equipment for use in hospitals and clinics.
HelpMate Robotics, Inc.	Specialized lidar (light direction and range) scanner and related locating technologies—demonstrated in the development of an intelligent autonomous mobile robot capable of maneuvering around on a factory or hospital floor.	HelpMate Robots in use as delivery devices in about 100 hospitals in the United States and Canada.
Illinois Superconductor Corp.	Fabrication process for thick-film, high-temperature superconducting materials—demonstrated in the production of radio-frequency components for wireless applications.	Two products—SpectrumMaster® and RangeMaster®—installed in 22 cell phone base stations in 12 cities.
Microelectronics Center of North Carolina	Integrated Force Array technology, based on electrostatically driven membranes.	Commercialization possible but not imminent.
Perceptron, Inc.	Image processing techniques and algorithms for developing specialized vision software.	Commercially demonstrated in lumber mill and steel mill.
PreAmp Consortium (Joint Venture)	A knowledge-based software system that can extract process “rules” from manufacturing process data—demonstrated in test automations for designing and manufacturing electronics components.	STEP Tools, Inc., an informal participant in the project, has incorporated the project’s data application interface in its ST-Developer™ software tool. Future commercialization possible for the complete system.
SAGE Electronchromics, Inc.	Electrochromic technology for producing large-area electronic devices.	Commercialization of electrochromic windows underway.
Saginaw Machine Systems, Inc.	Intelligent thermal-error correction technology, based on a generic mathematical model of thermal errors—demonstrated in high precision machine tool applications.	Accu-System—a new intelligent process controller for increasing the accuracy of machine tools.